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Service in a "White" Station

Eliminating Time Waste—Layout of Stockroom—Exchange of Worn or Damaged Parts—Facilities For Handling Motors and Other Parts

By FRED H. COLVIN
Editor, American Machinist

ONE of the things that impresses a visitor to the average motor repair shop or service station is the great waste of time. Not intentional waste to be sure, but the time required to look up parts, to hunt through books and to "get ready to begin to commence." Anything that eliminates a portion of non-

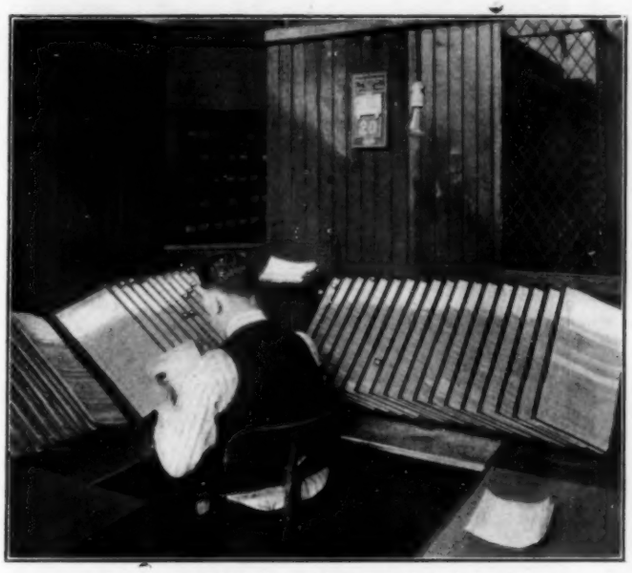


FIG. 1. RECORDS THAT ARE EASY TO USE

productive time makes for the efficiency of the service station and adds to the joy of the customer, both by speeding up his work and by reducing his bill.

The layout of the Newark, N. J., service station of the White Motor Company shows careful thought as to this question of saving time. And instead of hunting through volumes of heavy books for part numbers and the condition of the stock it uses the visible index system shown in Fig. 1.

The customer for parts comes directly from the street through a door to the small waiting room, shown at *A* in Fig. 2. A clerk located at the desk *B* takes his order over the window counter *C*. Turning to window *D*, the first clerk passes a duplicate of the order to the stock clerk at *E*, who has charge of the visible index shown in Fig. 1.

The stock clerk finds the card for the piece almost instantly and gives the location of the bin containing the part, if necessary. While the first clerk is getting the piece, the stock clerk puts the price on the order, changes his stock list to correspond with the deduction, and notes whether or not this brings him to the point of re-ordering or not. The customer gets his spare part quickly, the bill is ready at the same time, and there is a record of the whole transaction including the effect of the sale on the stock on hand.

One of the cards which forms the visible index is shown in Fig. 3. The cards are fastened on the leaves, as shown in Fig. 1, and keep a complete record of all stock ordered, received and delivered, a card being provided for each separate part. The left-hand portion of the card refers to orders to, and goods received from, the factory. The remainder deals with the local orders and shows the balance on hand at all times. There is also a space for the maximum and minimum amount to carry in stock. These amounts, of course, vary with the parts and can be changed when it seems advisable to do so. The maximum is usually a three months' supply, the minimum one month's.

Whenever the stock of any part reaches its minimum the stock clerk puts a red card in the index. This card bears the legend "Stock has reached a Minimum—Order Today." These cards are removed each day by the stock record clerk, the date and amounts of the orders being entered in their proper places on the regular cards, Fig. 3. When either the whole or part of the order is received, an entry is made in the proper column. If the order is not complete the date when the balance is due is also entered.

The form of order request used is shown in Fig. 4 and is known as Form R-96. The stock record clerk uses it to report to the storekeeper. This form is uniform for all the branches and instructions for using it are given on the back and are quoted herewith to indi-

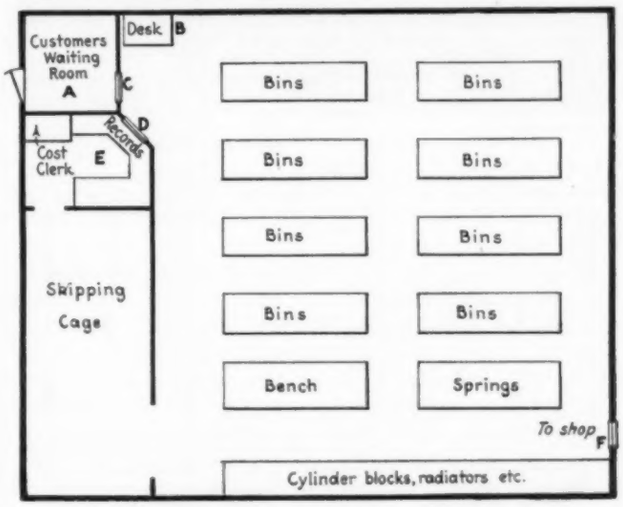


FIG. 2. PLAN OF THE STOCKROOM

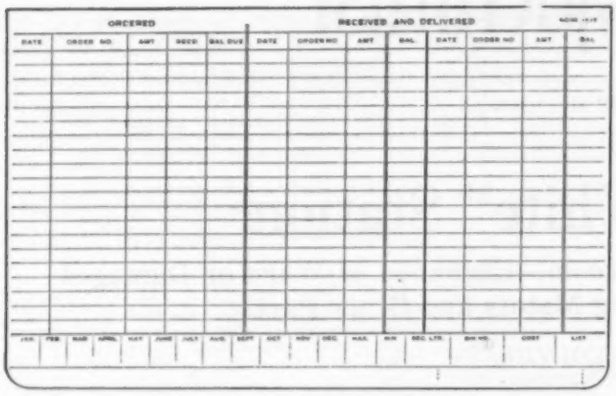


FIG. 3. STOCK RECORD CARD

cate the completeness of the control over the stock on hand. The instructions follow:

(1) The order request, Form R-96, is to be used by the stock record clerks in the branch offices for reporting to the storekeepers, at the close of each day's business, the various items of stock that have reached their minimum and should be ordered.

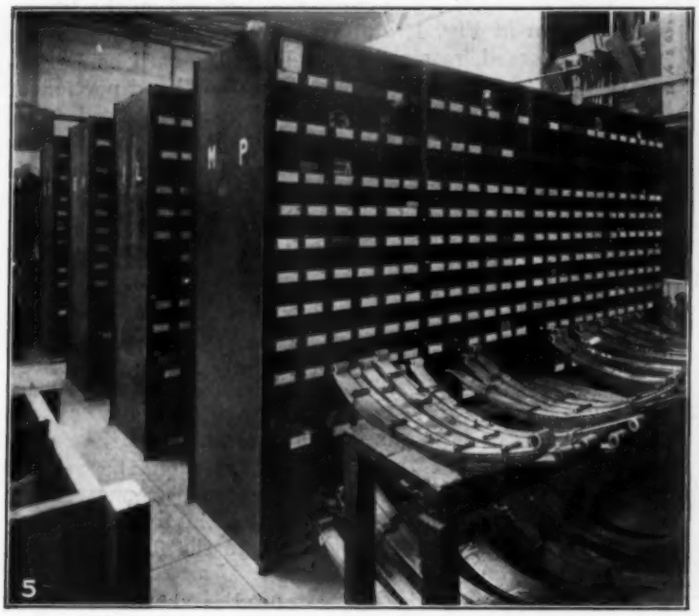
FIG. 4. FOR ORDERS FROM FACTORY

(2) The stock record clerk will list the items that are to be ordered in the numerical order of the parts numbers—The maximum quality, balance on hand, minimum, quantity used last three months and bin location should be transcribed from the stock record cards and listed on the order request form with each particular item. Particular attention should be directed to seeing that the quantity recorded in the "Balance-on-Hand" column agrees with the quantity actually in the bin.

(3) The order request will then be submitted to the storekeeper, who will assign shipping instructions, approve and refer to the typist for transposition to Form S-89.

(4) When the order has been transcribed to Form S-89 (not shown), the typist will enter on the order request "Date Order Entered," branch office order number, sign and return to the stock record clerk.

(5) The stock record clerk will then enter the order on the stock record cards and hold the order request pending receipt of acknowledgment of the order from the home office. Upon receipt of this acknowledgement the home office order number will be inserted in the proper place on the order request which will then be referred to the receiving clerk.



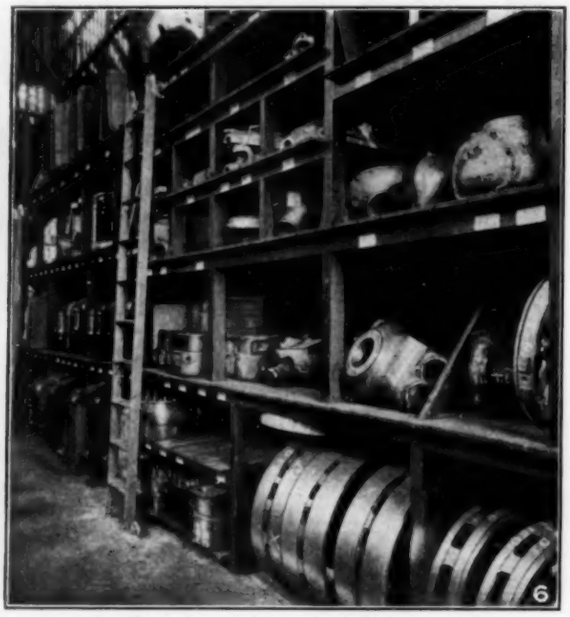


FIG. 5. STORAGE BINS AND SPRINGS. FIG. 6. SPARE CYLINDERS, RADIATORS AND WHEELS

(6) The receiving clerk will check and place in stock the parts, as received, noting in the column "Quantity Received" the amount of each particular item. The order request will then be returned to the stock record clerk, together with copies of the packing records, that proper entry may be made of the receipt of the material on the stock record cards.

(7) When the order is not received complete the stock record clerk, after making the necessary entries, will return the order request to the receiving clerk, who will hold it pending receipt of the balance of the items. When the order is completed and proper receiving entry has been made on the stock record cards the order request will be filled with the formal order.

(8) Provision is made in the upper right-hand corner of the order request for it to be numbered by the branches, if they so desire, to assist them in keeping

proper record of each order request issued in their offices.

Referring to Fig. 2 once more, the general layout of the stockroom becomes clear. The bins are of metal, numbered so that stock can be easily found. Bin 723, for example, is the twenty-third bin in the seventh row. The shipping cage adjoins the record office so that the proper bills and tags can quickly be made out and go with each shipment.

benches shown in Figs. 7 and 8. Completed motors are tested on the stand shown in Fig. 9 and it is the boast of the shop that when an overhauled motor leaves the shop it is a "White" motor in every way. It can be cranked in the usual way and does not have to be started by towing as is sometimes the case.

Just outside the stockroom and convenient to the rest of the shop is the toolcrib, shown in part in Fig. 10. Every effort is made to keep the tools needed so that

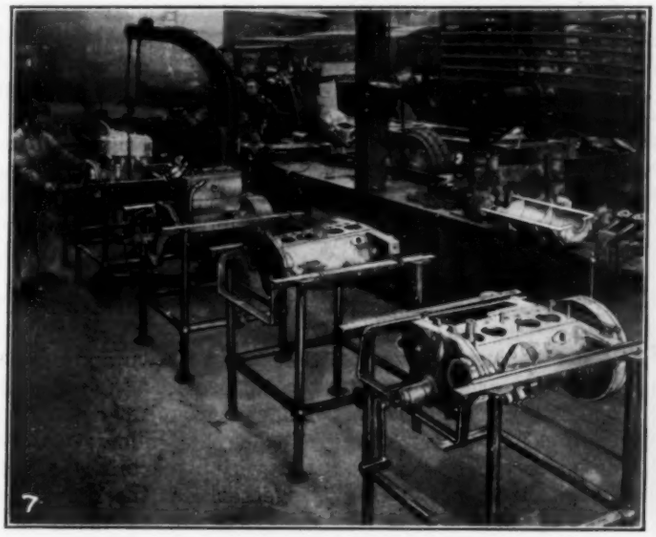


FIG. 7. STANDS FOR MOTOR OVERHAULING.

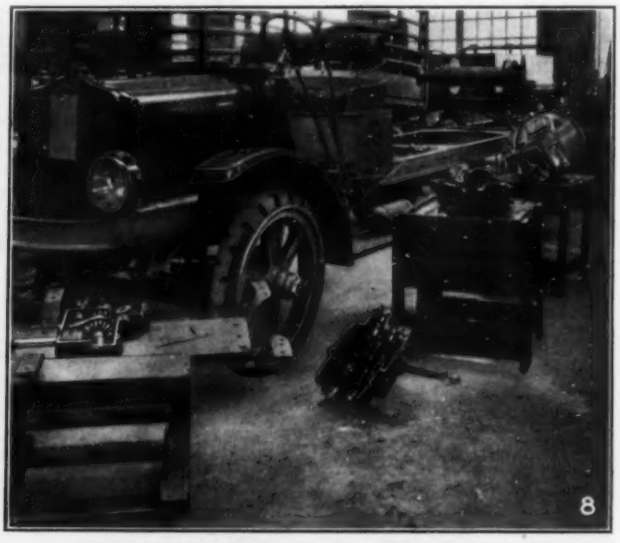


FIG. 8. OVERHAULING A TRANSMISSION.

FIG. 10. THE TOOLCRIB.

FIG. 11. MOTOR HANDLING FACILITIES

In Figs. 5 and 6 are shown some views in other portions of the storeroom and show how neatly and compactly the stock is kept. Springs, radiators, cylinder blocks, pistons, connecting rods and transmissions are kept in readiness to supply breakdowns and to get the truck into service again at the earliest possible moment. The repair shop draws parts from the corner of the store room as shown at *F* in Fig. 2. This avoids confusion with customers buying parts and keeps the two outlets for storeroom stock entirely separate.

This shop is equipped to handle, not only maintenance and replacement work, but also complete chassis rebuilding jobs. But the dis-assembling, replacing worn parts, fitting new bearings, etc., are handled on the stands and they can be quickly found and to see that they are in good condition. Tools are checked out in the usual way.

Facilities for handling motors in and out of the truck chassis are provided by an overhead monorail with hoists and by a portable crane. Rear axles, frames, etc., can also be handled in a similar manner as well as transmissions and other parts which require lifting by mechanical means.

One of the interesting features of this service station —one that emphasizes the word "service"—is its method of replacing or substituting parts to enable a truck to be kept in use. If for example, a leaf or two has been broken in one of your springs, your truck is not tied up

while the spring is being repaired. Instead, you drive into the station, the old spring is removed and a complete spring put in its place. You pay for the cost of changing the spring and of putting the broken spring into good condition. But in any case you do not have to buy a whole new spring in order to keep your truck in operation. Nor do you wait while it is being repaired.

This same system extends to radiators, magnetos, cylinder blocks, crankshafts, in fact to complete motors. The spring or radiator or motor which you leave is repaired and put in good order for the next man. They are not sold as new but they have miles of good service in them and at a fair price. And, after all, it is miles that you buy when you purchase a truck.

Cylinder blocks, ground and with pistons ready for assembling, are ready if through the freezing of a water

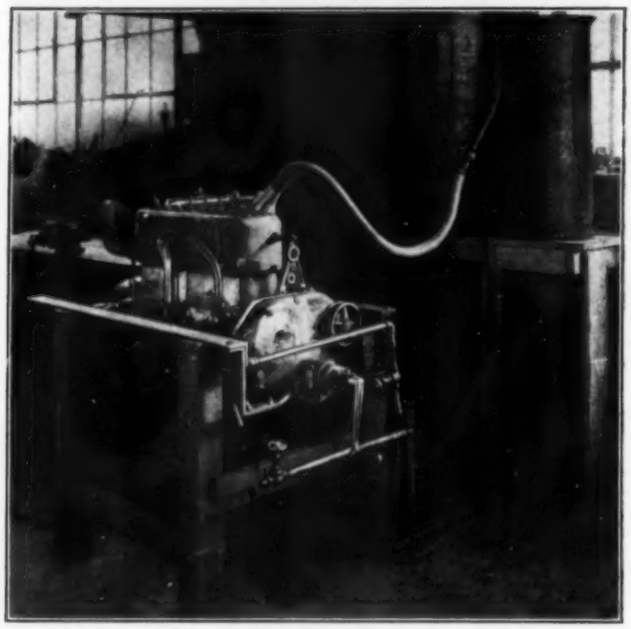


FIG. 9. TEST STAND FOR MOTORS

jacket or other cause, you need one. If faulty ignition can be traced to the magneto, a spare magneto is slipped into place and the truck immediately gets into the earning class once more. Meantime the defective magneto is repaired at your expense and put in stock ready to help out the next man who gets into difficulty from the same cause.

Spare wheels are in stock also, some with solid tires in various stages of wear or service and some without tires. Experience has shown that it is more satisfactory to rent these wheels than to sell them, the tire factor probably being responsible for this decision.

Service, the keeping of trucks in condition to earn dividends on the investment, seems to be the mainspring behind this station. It can well be the impelling motive in all repair stations which hope to build a lasting reputation for the motor vehicles which they handle.

Automobile Headlight Regulations

A great deal of interest is now being shown in regulations governing the headlights used by motor vehicles. The Bureau of Standards has assisted local authorities and the manufacturers through tests of these devices, and already quite a number of the states have framed laws to govern the use of lights on automobiles.

A Simple and Practical Apprenticeship System

By D. M. McLean

During the war many foundries, machine shops and other metal-working establishments were obliged to suspend their apprenticeship systems wholly or in part, due to emergency conditions and the necessity for the largest possible production of munitions. Under the type of organization necessary for this purpose there was little or no place for the apprentice as such, the employment of large numbers of machine operators and the subdivision of machine operations being carried out to an extent never before witnessed.

With the gradual return to normal, nearly all shops have restored their apprenticeship systems and, in some cases have revised them to meet present-day conditions. A well-planned, definite contract between employer and apprentice results in the greatest degree of mutual satisfaction and accord. Such an agreement cannot wisely be dispensed with nor can it be handled in a half-way manner.

It is generally admitted that a well-drawn apprenticeship contract secures to the apprentice: (1) A full opportunity to learn his trade thoroughly as far as equipment and facilities of the shop allow; (2) A definite rate of remuneration with a certainty of increases at proper intervals, together with the knowledge that special exertion on his part will be taken into account and will result in an earlier termination of the apprenticeship period; (3) personal interest in and observation of the apprentice by the employer. The regularly indentured apprentices in most shops today are under the care of a superintendent or supervisor, reporting directly to the general manager or the works manager. Whatever his title, the work of this official is of considerable importance and has a direct bearing on the progress of the apprentices and the future supply of skilled mechanics for the particular industry concerned.

From the standpoint of the employer, a definite and satisfactory apprenticeship contract guarantees to the employer: (1) Persistent service of the apprentice during the stated period; (2) a better type of apprentice. The requirements of the better forms of apprenticeship agreements insure more careful selection of candidates and a higher grade of intelligence in accepted applicants than formerly.

The incentives included in the later apprenticeship contracts usually include a bonus on completion of the apprenticeship period, allowance for attendance at classes of various kinds, and other ways whereby extra application will result in the earlier completion of the period. These all tend to the development of greater diligence on the part of the apprentice and his earlier arrival at a productive state, all of which are features of importance to the employer.

The apprenticeship form given herewith is suitable for use in medium and smaller size plants, and was adopted by an Eastern manufacturer as simple and effective after a careful investigation of the subject.

The increase in hourly rates at the end of the half year instead of yearly, the allowance for overtime, increase in rate when regularly employed on a night shift, allowance for attendance at technical classes and the admission of apprentices to any existing premium or bonus systems are all features which act as strong

incentives to continued application and persistence until completion of the apprenticeship period. They are seldom all employed by any one firm at one time, or embodied in a single contract form as in this case. This system, as here outlined, has been given a thorough trial for some three years, under the care of a supervisor of apprentices, with a marked quickening of interest on the part of the apprentices, and an increase in the number of applicants who wish to apprentice themselves to various trades.

TERMS OF APPRENTICESHIP
TO THE
BLANK MFG. CO.

AGE:	(1)	Apprentices must be not less than 16 years of age. They must be physically sound, of good moral character, and have received an education acceptable to the Company.
APPLICATION:	(2)	Application must be made on forms provided by the Company, and, if accepted, the applicant's name will be registered, and due notice given when he will be required to commence work.
TRIAL:	(3)	Apprentices must serve a six month's trial period. If the apprentice shall, during this term, prove satisfactory, and shall before the expiration thereof execute, together with his father or guardian, this agreement then his apprenticeship shall date from the beginning of the term of trial and shall continue for the full period, unless sooner terminated, as hereinafter stated.
TERM:	(4)	The term of apprenticeship is four years, each year to consist of 2,750 working hours, which, with the usual working week of 55 hours, is equal to 50 weeks —the remaining working days in each year shall be allowed apprentices at such time as the Company directs. If the apprentice works more than 2,750 hours in any one year, the extra time will apply to a reduction of the following year, or to his term of apprenticeship.
LOST TIME:	(5)	Apprentices shall make up lost time at the expiration of each six months period, at the rate of wages paid during said period, and no year of service shall commence until the apprentice shall have fully made up all time lost in the preceding year.
WAGES:	(6)	The regular rates of pay will be: 1st year: 1st 6 months, — cts. per hour, 2d 6 months, — cts. per hour, 2d year: 1st 6 months, — cts. per hour, 2d 6 months, — cts. per hour, 3d year: 1st 6 months, — cts. per hour, 2d 6 months, — cts. per hour, 4th year: 1st 6 months, — cts. per hour, 2d 6 months, — cts. per hour.
OVERTIME:	(7)	All overtime will be paid at —% increase over regular rate of pay.
NIGHT WORK:	(8)	In case an apprentice is required to work on a night shift, his rate of pay will be increased — cts. per hour.
TECHNICAL CLASSES:	(9)	Apprentices will be allowed one day off their time on any period, for each evening they attend a class of the Industrial Drawing Schools, or of any approved technical classes of the Y. M. C. A., or other approved institution.
PREMIUM CONDITIONS:	(10)	Apprentices will be afforded the advantages of our premium or bonus system, whereby their earnings are increased for higher production, in accordance with the provisions of this system.
PRESENT:	(11)	At the expiration of 11,000 hours of apprenticeship, a present of Fifty Dollars ($50.00) will be made to the apprentice signing this agreement. Should an apprentice leave our employ, this agreement is cancelled, and would not apply on another engagement, without another signed agreement.
TOOLS:	(12)	Apprentices are allowed to purchase all necessary tools from the Company at cost, and pay for them in easy weekly payments.
CONDUCT:	(13)	Apprentices will be required to perform their duties with punctuality, diligence and fidelity, and to conform to the rules and regulations which are or which may be adopted for the government of the shops.
TOBACCO:	(14)	Apprentices are not allowed to use tobacco in the shops during working hours.
TERMINATION OF ENGAGEMENT:	(15)	The Company reserves the right, whenever the state of business demands it, to shorten the hours of labor, or whenever, for any reason, it shall stop the works, to suspend apprentices wholly or in in part; and the making up of time so lost shall be at the discretion of the Company. The Company also reserves the right, in its sole discretion, to terminate its agreement with any apprentice, also to discharge him from its employment for non-conformity with its rules and regulations, want of industry or capacity, indifference to his duties or improper conduct within or without the shops.

Romances of Metal Working
The Smith Who Couldn't Be Burned

BY H. H. MANCHESTER

According to a story in one of the manuscripts of the Arabian Nights, reports kept coming in to one of the head men of the district that there was a blacksmith who could handle live coals without being burned. In order to look into this, the officer, who was very religious, dressed himself as an ordinary traveler and stopped at the smith's. There he saw the smith handling hot iron unconcernedly. He watched to see if the smith used any black arts to protect himself, but witnessed nothing of the sort. At night and in the morning he saw that the smith attended to his devotions scrupulously, but did nothing that could protect himself from the fire. At last, unable to discover the explanation of the miracle, he disclosed his identity, and demanded of the smith how he did this thing. Whereupon the smith told him the following story:

"Several years ago I was enamoured of a beautiful slave girl, but she would have nought to do with me because it was against the law. At last when the days of the famine came, she came to me and asked for food, but I was wroth at her, and said to her, 'You who have repulsed me, shall not have one bit of bread from me as long as you treat me thus.' But she rose and left me saying: 'Better I should die of starvation than break the law.' Twice more she came to me for food, and each time I repulsed her as before. The fourth time, however, I thought to myself, Who am I, that I should place my wishes in the scale with a human life? And I set food before her, and bade her eat and fear not. Thereupon she said, 'Inasmuch as you bid me to eat unafraid, I pray to Allah that you may hereafter handle red hot iron and live coals without danger.' And ever since then it has been as she prayed."

Leaving out of consideration the smith's explanation, the legend indicates that the secret of handling live coals as practiced by modern exhibitors was already known to certain members of the craft.

Metallic or Carbon Electrodes for Arc Welding

When welding sheets below ¾ in. in thickness, it is best to use a metallic electrode. However, for mefal over ¾ in. thick it is ordinarily preferable to employ a carbon electrode. These statements were made by A. L. Price, of the Franklin Machine and Steam Boiler Works, when addressing recently the Metropolitan Section of the American Welding Society.

There was no question in the speaker's mind as to the fact that the metallic electrode gives a stronger and more satisfactory joint when arc welding. Welding may be performed much more rapidly with carbon electrodes, although the joint produced is not quite as strong as that obtained with metallic electrodes. Under favorable conditions in both cases, the speed of welding a seam is about 4 ft. per hour when using a metallic electrode, and about 15 ft. per hour when using a carbon electrode.

When the carbon arc process is used, the metallic rod that is fed in to form the weld is ordinarily ¾ or ½ in. in diameter. It should be noted, however, that in order to properly use the carbon electrode with speed and with satisfactory results, a more skillful operator is required than when using the metallic electrode.

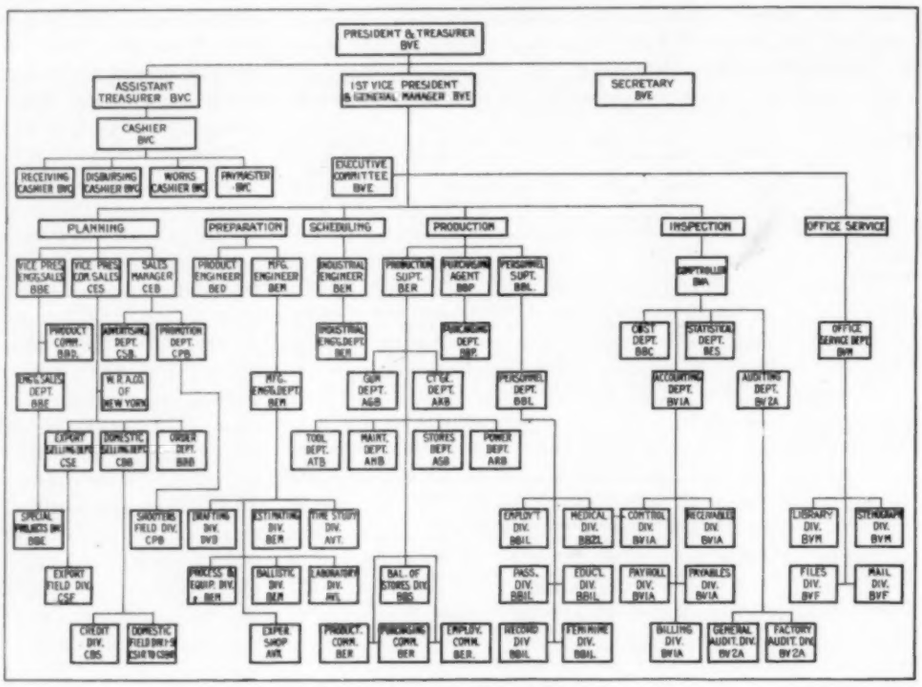
Organization Efficiency

Getting Ready for Production—Starting the Longest Job First—Special Tools Designed in Drafting Room—Work Speeded Up by Departmental Competition

By CHARLES SORENTRUE

IN THESE times of depression, it is absolutely necessary for all manufacturers to operate at minimum cost and one of the first essentials is an efficient organization.

When any concern decides to develop and manufacture a new product, the experimental and other engineering work is too often allowed to proceed for a lengthy period before any definite procedure and schedule is decided upon. As a rule, the men engaged in the experimental and designing work will claim that work of this nature cannot be planned and scheduled with any degree of accuracy; but nevertheless, with an efficient organization it can be done. This was tried out by one of the largest munition plants in the country when it received instructions from the U. S. Government to complete the development of machine rifles and get into production. This rifle was perfected and manufacture started on a production basis within about three months after the rough model was delivered by the Government.



ORGANIZATION CHART

The work was all done according to a schedule established when the rough model was received and, due to the efficient organization, guns were produced on a manufacturing basis three days prior to the original scheduled date of completion. Shortly before the work was started, a reorganization of the personnel of the plant was effected on a five functional basis, viz: 1, Planning; 2, Preparation; 3, Scheduling; 4, Production; 5, Inspection. These functions are briefly defined as follows:

(1) Planning decides what and how.
(2) Preparation provides the means.
(3) Scheduling determines when.
(4) Production applies the force.
(5) Inspection determines the result.

In smaller organizations these functions can often be combined, but nevertheless they are all necessary to properly accomplish any task. The accompanying chart gives a general idea of this plant's organization as a whole.

I will now briefly outline how this organization accomplished the work of developing and producing the rifles in such a remarkably short time. In doing so it will only be necessary to describe the work as done by the preparation department which department consisted of the manufacturing, engineering and production engineering divisions, as this was the only department involved until the necessary equipment had been provided for the production department to enable it to start producing.

As soon as the rough model of the gun was received the scheduling supervisor of the preparation department, after very careful study of the whole situation, made a master schedule which called for completion of the following items on certain dates:

1st	Completion of	component drawings.
2nd	"	" a perfected model gun.
3rd	"	" operation lists by components.
4th	"	" steel specifications and delivery of steel.
5th	"	" equipment drawings.
6th	"	" manufacture of equipment.
7th	"	" First 100 guns on a production basis.

The schedule for the engineering work was made so that the longest jobs would be started first, and this is one of the most important points often overlooked by manufacturers. Another point of prime importance watched very closely by the follow-up men, was to make certain that the tool drawings and then the tools were completed in the proper sequence, so that all tools for the first operation would be completed before those for the second operation and so on down the line.

Having only one unfinished model of the gun and no finished component drawings to start with, the first step scheduled was to make a full size assembly drawing from which was developed a perfected model and finished component drawings. While this work was being done the equipment engineers were planning the opera-

tion lists, which included operations, fixtures, gages, special tools and machines required to start production. In conjunction with these engineers the steel experts decided upon steel specifications for the components, so that the purchasing department could order the steel required for the different parts.

As soon as each operation list for a component was completed, a detail drafting schedule was established which called for completion of equipment drawings by parts and operations on certain dates and, as stated above, a systematic follow-up maintained to make certain that these schedules were adhered to.

In addition to the component drawings and experimental work, approximately 300 fixtures, 100 gages and 400 special tools were designed by the drafting room and made by the tool department. Each fixture, tool and gage was completely detailed by the drafting room, as it was found from previous experience that this was the safest, most economical and expedient method to follow. The idea of some organizations that fixtures and other tools should not be completely detailed by the drafting department is a big mistake, because if the draftsmen does not do this the toolmaker will have to do it; and when you consider that the draftsman has drawing tools, handbooks, etc., which the toolmaker does not have in the shop, it is certainly more economical to have this work done in the drafting room.

Designs of Tools and Gages Approved By Equipment Engineer

Another point which is worth while mentioning here is the method which was followed for approval of all designs of tool and gages. Each design was approved by the equipment engineer who planned the operation list, in conjunction with the production shop foreman who was to use the equipment. This was done as soon as the preliminary design was completed, and by following this procedure the shop foreman had no criticism to make of the equipment when he was ready to use it. Previous to establishing this procedure the production shop foreman would, as a rule, criticize most of the tools designed without his approval.

The personnel working on this gun was not very different from that employed on previous guns; but under a new general manager, new organization methods had been introduced which brought about a much closer co-operation between the different departments and by so doing accomplished in three months what had heretofore always taken from twelve to eighteen months to do.

By certain records and charts maintained for the different departments, each department was installed with the spirt to do better than the other departments both in quantity and quality of work produced. With this spirt all through the organization the results accomplished can be imagined.

In perfecting any organization one of the most important essentials is to place men in the executive positions who not only know how to gain the confidence and co-operation of the men whom they supervise, but who also know how to co-operate with their superiors and other executives of equal authority in the same organization. No organization will be efficient unless there is co-operation all along the line.

Italian Engineers To Stage Fair

Modern building machinery and construction materials have been in great demand for reconstruction in Europe since the war. To better meet this demand, the National Association of Italian Engineers, under the auspices of their Turin section, in collaboration with local authorities and principal industrial institutions and technical associations, have arranged a sample fair to take place at Turin, beginning April 1 and extending through May, 1922. Exhibits will include the following articles:

Class 1.—(a) Building materials (lime, cement, bricks, natural and artificial stone, earthenware, metals, asphalt, etc.); (b) machines for trying building materials, having special reference to quick trials.

Class 2.—Machinery for shipbuilding yards of every description, and for the preparation of construction (means of transportation, steam shovels, elevators, mortar mixers, concrete blocks, bricks, paving stones, pipes, and other materials.

Class 3.—Construction systems and their application (reinforced concrete, hollow concrete blocks, special bricks, construction of walls, scaffolding, dismountable materials, waterproof coverings, etc.).

Class 4.—Mural decorations (wooden and iron fittings and their parts, doors of every description, stucco, marbles, panellings, floorings, glass and glassware, paper hangings, etc.).

Class 5.—Samples of construction materials for the "unification of types."

Class 6.—Various installations (heating, electrical apparatus, elevators, hydraulic apparatus, sanitary, etc.).

Class 7.—Drawings and models of buildings, having special reference to economic houses and rural buildings.

Class 8.—Specimens of completed buildings.

Class 9.—Publications and periodicals dealing with building and professional construction.

Further information may be obtained from the Bureau of Foreign and Domestic Commerce, Department of Commerce, Washington, D. C., by referring to file No. 1182.

History of the Patent Office Relief Bill

In 1917, as the Patent Office had lost a great many of its trained examiners and was unable to get suitable men to take the places and become trained as examiners, because of the insufficiency of the salaries (which had only been raised 8 per cent since 1848), the National Research Council was requested by the Patent Office to appoint a committee to investigate the situation and aid the Patent Office. Dr. William F. Durand of the council and of the American Society of Mechanical Engineers, was appointed to select the committee. The committee selected consisted of Dr. L. H. Baekeland, Dr. R. A. Milliken, Dr. S. W. Stratton, Dr. M. I. Pupin, Dr. Reid Hunt, Frederick P. Fish, Hon. Thomas Ewing and C. P. Townsend. Calvin W. Rice having been invited by Dr. Durand to name a representative for the A. S. M. E., designated Edwin J. Prindle who was later elected secretary of the committee.

The result of the efforts of this committee was the drafting of a report strongly favoring relief of the Patent Office and of the Nolan Patent Office Bill, H. R. 11,984. This bill was unanimously approved by the Patents Committee of the House of Representatives, and extensive hearings were held by the Patents Committee of the House, at which the secretary of the Patents Committee of the National Research Council was placed in charge of the production of witnesses and testimony.

Other Patent Committees

The Engineering Council appointed a patent committee to aid in the passage of the bill, as did the National Association of Manufacturers, the American Chemical Society, the American Patent Law Association and other smaller or less interested organizations.

In order that we might ask for a "rule," making the bill special and giving it an early vote a hearing was arranged before the Rules Committee of the House. The hearing was attended by over sixty representatives of all of the organizations interested in the passage of the bill, including substantial representation of every one of the engineering societies which were represented on the patent committee of the Engineering Council. The production of testimony was in charge of the chairman of that committee.

The desired rule was granted and the bill passed the House by a large majority, and went to the Senate.

In the Senate, a bill known as the "Federal Trade Commission Patent Bill," which had passed the House of Representatives, was attached to the Nolan Bill as an amendment, and the salaries specified in the bill were badly cut by amendment. The industrial public had not realized certain possible ultimate reactions of the Federal Trade Commission Bill, and considerable opposition to that portion of the Nolan Bill appeared. The bill was sent to a conference committee, composed of representatives of the House of Representatives and the Senate, and a hearing was obtained before that committee, although such hearings are not customary. Again, a very large delegation of all interested organizations was gathered, and after earnest and vigorous arguments, the conference committee recommended that the figures for salaries be restored to the values as they passed the House.

In spite of the almost unanimous demand that the Federal Trade Commission section be eliminated from the bill, the majority of the conference committee, retained that section. The bill, as recommended by the majority of the conference committee, was repassed by the House of Representatives, but it failed in the Senate solely because of the presence of the Federal Trade Commission section. On March 3, 1921, Mr. Prindle tried to reconcile Senator Reed Smoot, the chief opponent of the bill, and Senator Norris, the chairman of the Patent Committee of the Senate, Senator Smoot offering to give up his objection to the salaries if Senator Norris would give up the Federal Trade Commission section; but neither would yield.

A campaign was then organized for the purpose of creating sufficient sentiment to convince Congress that the Federal Trade Commission Bill should not be enacted, either as an amendment of the Patent Office Bill or in any other form, and thus to eliminate it entirely; and that campaign was successful. The Nolan Patent Office Bill was then reintroduced into the House at the new session of Congress, which began in April, and again unanimously reported by the Patent Committee, taking the name of the new chairman of that committee, Mr. Lampert. Although repeated efforts were made, the bill could not be brought up for a vote, and it finally developed that the floor leader of the House, Congressman Frank W. Mondell, was opposed to it. A delegation of patent lawyers from New York, Massachusetts, New Jersey and other states, called upon him, the chairman of the patent committee of Engineering Council being designated one of the two speakers.

Mr. Mondell stated his opposition strongly, on the ground that the proposed salaries were too high and that it would interfere with the bill for the general reclassification of governmental service in which he was interested. Another campaign was started through all of the organizations interested in the passage of the bill, for the purpose of inducing Mr. Mondell to consent to the bill's being brought up for a vote and to insure that it would be passed. The campaign succeeded and the bill came up for a vote, and, although Mr. Mondell and a number of other leaders of the House strenuously opposed the bill, it passed by an overwhelming majority.

Bill Passes Senate

The bill then went to the Senate and was unanimously reported by its Patent Committee, a similar campaign in favor of the bill being directed at the Senate at this time. On Feb. 14 the bill passed the Senate, without a single negative vote, and became a law on Feb. 18 by the President's endorsing his approval thereon.

The bill adds $451,000 to the payroll of the Patent Office, and increases the salaries of the examiners approximately 45 per cent, and the number of examiners 10 per cent. The bill also contains an amendment to the patent law which will make a money recovery possible in all patent infringement cases where the patent has been held to be valid and there has been any substantial use of the invention. Heretofore the rules governing accountings in patent infringement suits have been so technical and illiberal that a money recovery has been impossible in most cases. Recently a few decisions have been rendered in which a more equitable principle has been applied to a limited class of infringement cases. The amendment makes the said principle statutory and extends its application to all classes of infringement cases. The amendment has been approved in principle by a number of United States Judges, and no judge has disapproved of it. It is believed that it will greatly stimulate the production of inventions.

Press Tools for Aluminum Ware

Press Tools for Blanking, Bending and Perforating—How the Body is Drawn—Spouts Attached by Use of the Welding Torch

BY FRANK A. STANLEY

THE halftone, Fig. 1, illustrates one of many lines of aluminum utensils manufactured by the Aluminum Products Co., of Oakland, Cal. In this view the article at the left is shown before the spout is

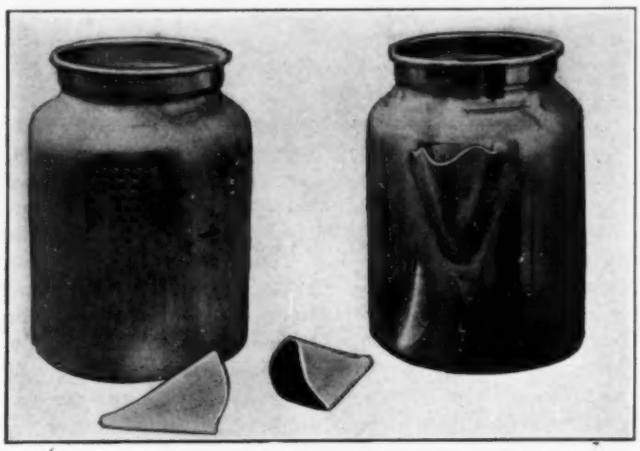


FIG. 1. AN ALUMINUM UTENSIL WITH SPOUT AND STRAINER

secured in place in order to illustrate the arrangement of the perforated holes through the shell.

The spout is blanked out in the form of a segment by means of plain tools as shown by Fig. 2. The die consists of the usual tool steel body secured in a seat in the die base by means of screws and dowel pins. There is a stripper plate over the top of the die carried upon blocks or bushings of the proper height for holding the plate in place. At the side of the plate is a stop for controlling the feeding movement of the strip of aluminum.

The punch consists of a steel block attached by screws to a holder, the latter having a shank to fit the ram of the press. In order to bend the blank to the necessary shape for the spout the work is passed through the second operation tools illustrated in Fig. 3. Here an

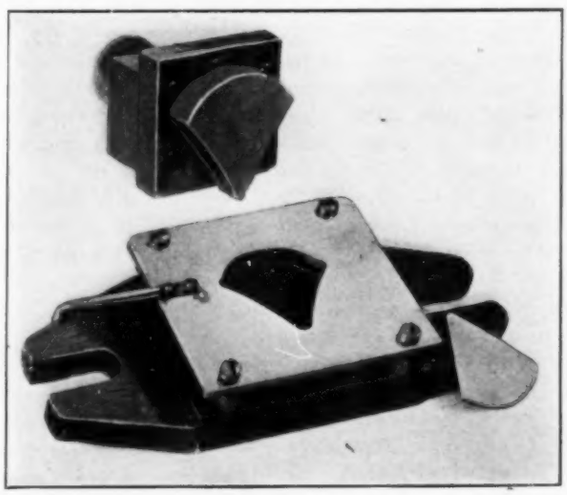


FIG. 2. BLANKING TOOLS FOR THE SPOUT

open bending die is used, being mounted on a base planed across the top to form a seat in which the die proper is fastened securely. The blank to be bent is nested against suitable stops on the die face. The punch is of the solid type and is made in the form illustrated at the right of the photograph.

The perforating operation is accomplished with the tools shown in Fig. 4. The die is of the horn type over which the work is placed for the perforating operation. In the top of the horn is dovetailed a tool steel shoe which forms the die proper. The top of the die is finished to the same radius as the utensil to be perforated, while at the back is a depression to clear the neck of the utensil and allow the work to be seated firmly on the curved face.

The punch is shown at the right in Fig. 4. It consists of a steel holder carrying a set of inserted piercing punches which pass through the spring pressure pad or

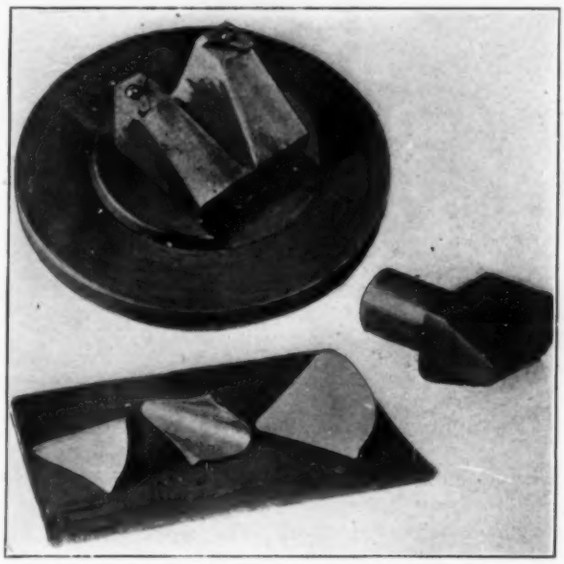


FIG. 3. BENDING TOOLS FOR THE SPOUT

stripper plate shown below the punch face. As the punch descends upon the work this pressure pad serves to clamp the utensil firmly to the die horn and, the downward stroke continuing, the piercing punches are passed through the work.

The blanks from which the work is drawn are about 13½ in. in diameter, the metal being $\frac{1}{16}$ in. thick. The drawing is done in three operations without reducing the thickness of the metal. The first drawing operation produces a shell about 3 in. deep and 8$\frac{7}{16}$ in. in diameter. The punch for this first drawing is 8$\frac{5}{16}$ in. in diameter or smaller than the die opening by twice the thickness of the metal. In the second operation the shell is drawn to a diameter of 6½ in. and a depth of 5¼ in. The third operation draws the shell to 5$\frac{3}{8}$ in. in diameter and a depth of 6 inches.

The drawing face of the die is a tool steel plate about 1 in. thick, hardened and secured to the bolster by

screws and dowels. The drawing edge of this die is given a liberal radius, practically ¾ in. The punch is rounded at the lower end to start the metal freely into

FIG. 4. THE PERFORATING TOOLS

the die. The punches used in the different operations are cast iron.

Following the drawing operation the aluminum shell is placed in a spinning lathe where it is necked and shaped to the outline shown in Fig. 1. It is then ready for the mounting of the spout as in Fig. 5. Here a

FIG. 5. ATTACHING THE SPOUT

bench is shown with a handy work stand which is swung in front of the operator as he applies the oxy-acetylene torch to the job. The work holding fixture consists of three radial arms and hubs over which the aluminum ware is slipped. The spout is held firmly in contact with the body or shell by a spring fork above which presses against the sloping face and is of such form as not to interfere with the free application of the torch.

Labor Cost in Building Machine Tools

By Simeon Williams

The article entitled "The Bugaboo of Production Costs," on page 305 of American Machinist, reports conditions so widely at variance with actual practice that some truthful statements should be made to correct any wrong ideas brought out in that article. I cannot imagine a machine tool in which the labor cost reached only 10 per cent. I know of one case where the actual labor cost was over 33 per cent of the selling cost. That, is, too high of course, but compared with 10 per cent, is far nearer actual practice.

Possibly the statements made about sumptuously furnished offices for several officials, and only ten people in the factory may have been true in one isolated instance and for a short time only, but common sense will teach any one that this could not continue long in any business.

The statement that $69 was the labor cost of a Ford car may be true of the actual Ford shops, but many parts are bought complete, like the tires, carburetors, lamps; further than that, there is a large amount of labor used to produce the steel and other materials for the car before these materials reached the Ford shops. To write an article purporting to show that labor in any article sold is as low as 10 per cent is absurd, and must have been written either by some one of very strong and pernicious, socialistic tendencies, or for the sake of an argument to bring out the correct views.

Labor costs are the controlling cost factor in everything we buy. It is true that selling costs are a considerable item, but in the machine tool business, most machines are sold through dealers on a 10 per cent basis. Some are for less, but a very few may go as high as 15 per cent—and only a very few. Overhead, based on labor costs, runs anywhere from 60 per cent to several hundred per cent, but the latter is for dull times when but few productive men are employed and when the management skeleton of good business times must be maintained. In that case, it is largely "labor" though not the actual time of men working on the machines.

The more labor saving machines and devices we produce and sell, the better for all, for then labor costs will be reduced.

Labor the Controlling Cost in Everything

Everyone should understand and every last person should know that labor is the controlling cost in everything. Take rents for example, as that is the largest expense of any one item in city living. The only reason rents are high is because the building trades have exerted every possible means, fair and unfair to keep up the wages of masons, carpenters, plumbers and all engaged in building or repairs. If they would take a fair wage, and be employed all the time, they would be far better off than at present. Buildings could then be erected to rent at a fair price, while repairs could be made at such low prices that rents would come down. Railroad rates, both passenger and on coal (for coal is one of the highest items in living expenses), are high because of the amounts paid to labor. Taxes are the same, and everything except the air we breath is high because of labor costs. Except at the present time, farm produce is low where it can be obtained direct, and where the transportation costs and dealers' costs do not enter into price of sales.

The present depression is caused more than anything else, by the continued demands of labor for more pay, until the prices of all manufactured articles became so high that people could not buy them. Then production stopped, for factories cannot run without a constant stream of sales, and thus depression spread all over the country. If all labor would go to work for 1914 wages, then production would start again, for more could afford to buy, and no sales would be made. Labor costs caused high prices, and high prices paid to labor caused the depression.

New Tools in Jobbing Shops

By H. L. Wheeler

Concerning the merits of the various classes of machines and methods for doing accurate machine work many different factors must be taken into account.

Though having had considerable experience in manufacturing, particularly of small arms and automobiles, my experience as a foreman has been exclusively in large general jobbing shops doing repair work and building most any kind of special machinery to order in small lots. This class of shop seldom harbors the best of equipment, and in my experience the ones having the old machines seem to make the most money.

Whenever a salesman came around with a new tool the old man always wished him off on me. I recall a salesman once who was selling a new toolholder. It was a fine proposition for a shop with modern lathes but for our shop it would have been but an ornament. I had to tell this man that we could not use it on our machines and that he had better try to sell the boss some new lathes first. He was convinced, when I showed him a lathe built about 1869, that his toolholder was altogether too fancy for our business.

Accurate Work Depends Upon the Man

From my experience I believe the production of accurate work depends almost entirely upon the man rather than the machine. To illustrate this contention let me cite an instance which happened while I was foreman in this shop. Our "toolmaker" was the man who took care of all small work and in addition looked after our large stock of flat drills, cold chisels, crowbars, chains, jacks, etc., and kept them in repair. He had been employed in the shop about twenty years and was a good mechanic. A part of the shop on the second floor was fenced off as a storage place for tools, and here our toolmaker was enshrined with an old lathe about 12 in. by 4 ft. It was the kind of a lathe that is guaranteed to take the heart out of anyone but an old timer—as were all the other tools in the shop.

A customer brought in eight poppet valves one day with the stems badly worn and wanted new stems put on. He was a very fussy person and cautioned me to have the diameter of each and every stem alike and to a micrometer size, no guesswork or caliper measuring would he accept. As I recall it the size was something like 0.481 in. in diameter by 10 in. long.

The old stems were cut off and new oversize stock (chrome nickel steel) welded on, and our toolmaker was assigned to the job of turning them. This man was exceptionally expert with calipers and could make a real fit on anything; but that 0.481 in. sort of got his goat. However we had to get the job done and I knew that a micrometer was absolutely essential so I instructed him in its use; furnishing one from my own kit. I had him practice for a while on some odd pieces of stock and in a short time he was able to get the idea and turn out a piece true to size.

By this time our smith had completed his part of the work and the toolmaker was ready for his first micrometer job, with full confidence in his ability to use the "mike." With the aid of a new file and some fine emery cloth, the finished job would make a modern grinder hand sit up and take notice. Eight valve stems were finished straight and true to size; at any rate our customer was very much pleased and said it was a good job. Thereafter our toolmaker had a little more respect for a micrometer and purchased one for his own work.

Any machine can be made to do good work. It's the man behind—like the man behind the gun—that counts. In 1915, in this same shop I was called upon to produce 75 lead screws for another company that was building some lathes for the British government. Could we do it? Yes we would build a battleship for Uncle Sam, or at least would not refuse a try at it.

The best lathe I had available for the lead screw job had seen something like sixty years of service. An extra screw was kept on hand for special jobs such as this. The stock for the job (ground stock) was furnished to us together with cutting tools and a gage which had to pass over the job when finished. The specifications were rigid, as all government specifications are. The screw was 2 in. in diameter by about 10 ft. in length, ½-in. pitch and 14-deg. thread. This job was finished and every screw was passed.

The next job assigned to that lathe was four large pipe coils, from 2-in. wrought-iron pipe. The coils were approximately 28 in. outside diameter by 5 ft. in length. Needless to say a micrometer was not used on this job; just a few heavy chains, iron straps, a couple of crowbars, some heavy timber, double back gears, slow speed and a little elbow grease.

Some machines in a jobbing shop will necessarily stand idle for days, and even months, at a time. It is evident that where machines have only a junk value there is little or nothing to worry about when a slack time comes. On old machines there are no depreciation charges; or at least it would not pay to bother about them if there were. A fair price is charged for the work, customers of years' standing pay their bills and come back, and the boss generally has cash in the bank and don't need a folderol system to tell him how things are going. If the bank balance is good he greets you with a smile and hands out a good smoke; if it isn't you will not need to be a mind reader or an efficiency engineer to know it.

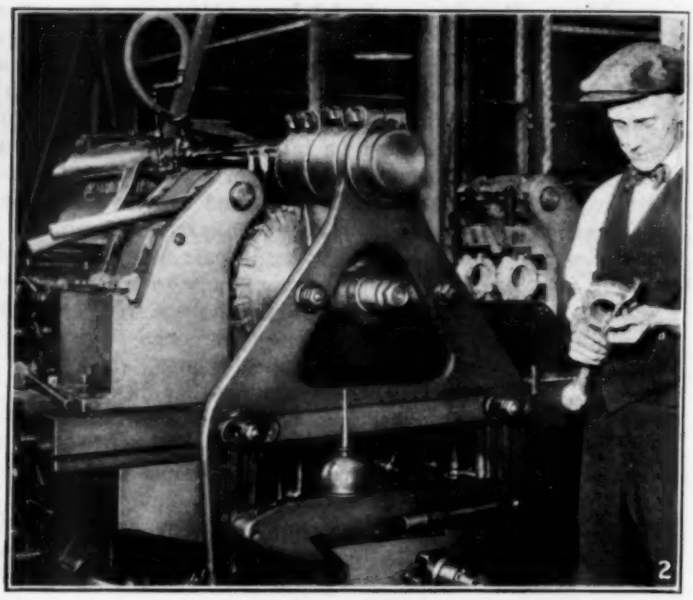
No man of small means should attempt to start in the jobbing business with the latest and best in machines and equipment and even jobbing shops long established would do well to keep what they have.

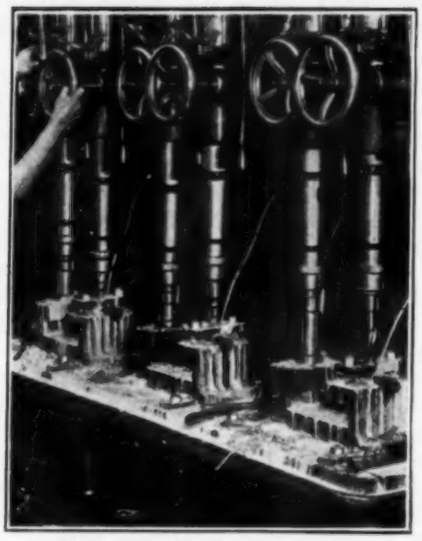
Manufacturers Must Have Best Equipment

Manufacturing enterprises, on the other hand, cannot afford to be without the very last word in machines and tools. Buy a new machine today and scrap it tomorrow, if necessary, to keep up with competitors. In manufacturing work, full automatic, semi-automatic and hand operated machines are used with equal success. The class of machine to be used depends more upon the quantity than the quality of the work. Automatic machines are known to be very accurate and were it not for the wearing down of the cutting tool they could probably turn out duplicate parts indefinitely.

Special, or single purpose machines are rapidly replacing standard designs in many lines of manufacturing and will no doubt reduce the cost of certain operations where the quantity to be turned out warrants their use. Quantity production and practically continuous operation are necessary to justify special machinery, or in fact any high-priced machine.

A general jobbing business will seldom prosper with high-priced machines, but with the right kind of men and machines having a value of about one-half cent per pound they will make money when the big fellows are idle.

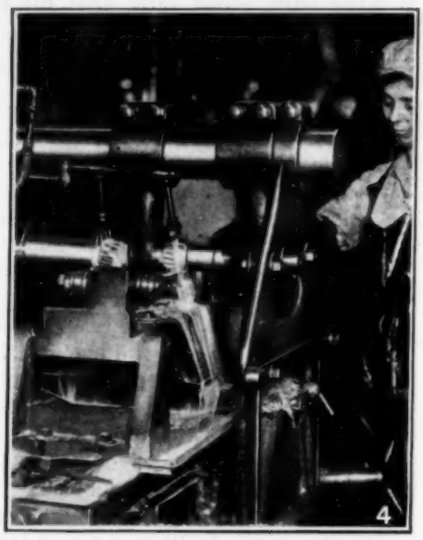




Marmon Connecting-Rod Methods

BY FRED H. COLVIN
Editor, AMERICAN MACHINIST

SOME idea of the care used in the production of Marmon connecting rods can be had from the illustrations on this and the following pages. Each rod is given a Brinell test as shown in Fig. 1, after which the sides are milled by large inserted tooth cutters in the fixture shown in Fig. 2. This view shows the method of clamping. The clamps, to be seen at the right, straddle the bolt bosses.



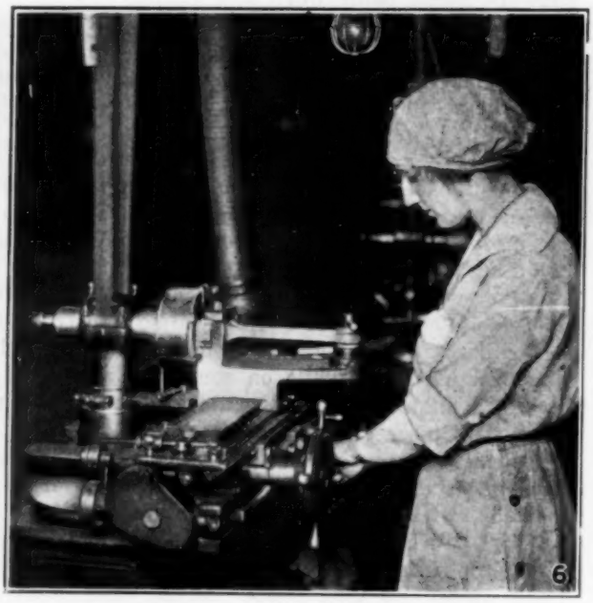
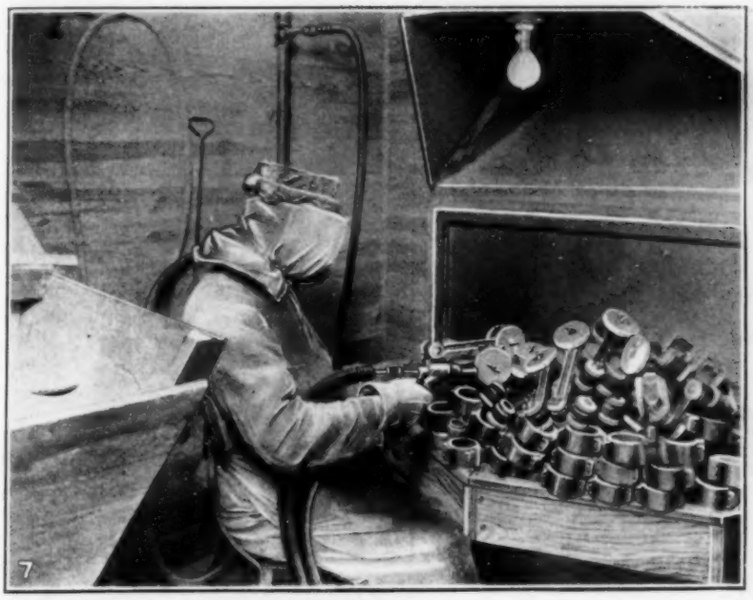
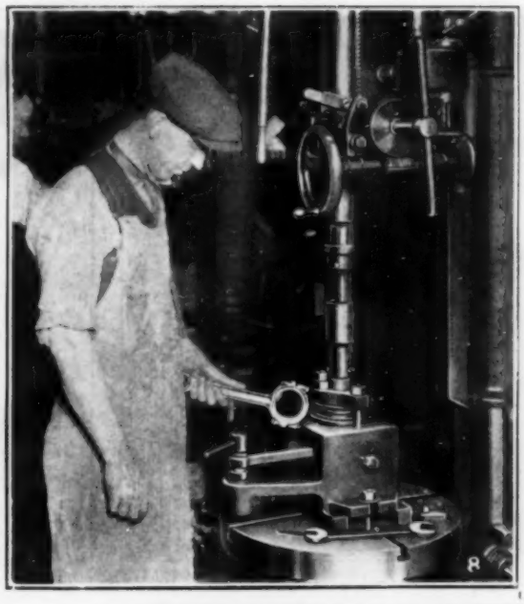
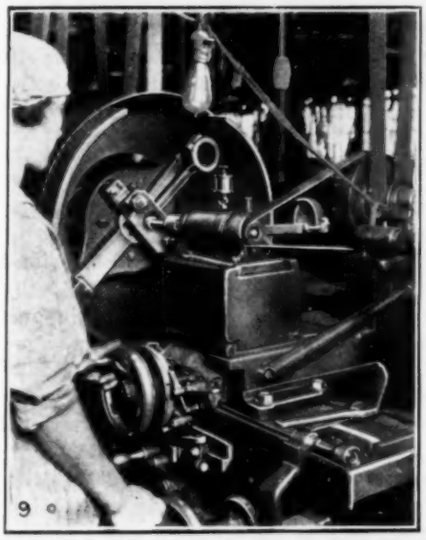


FIG. 1. TESTING CONNECTING ROD FORGINGS FOR HARDNESS ON A BRINELL MACHINE. FIG. 2. MILLING THE SIDES OF THE RODS IN A SPECIAL DOUBLE FIXTURE. FIG. 3. BORING AND REAMING RODS. FIG. 4. MILLING EDGES OF RODS IN DOUBLE FIXTURES. FIG. 5. PROFILING THE SMALL ENDS. FIG. 6. GRINDING ROD FOR CAP BEARING

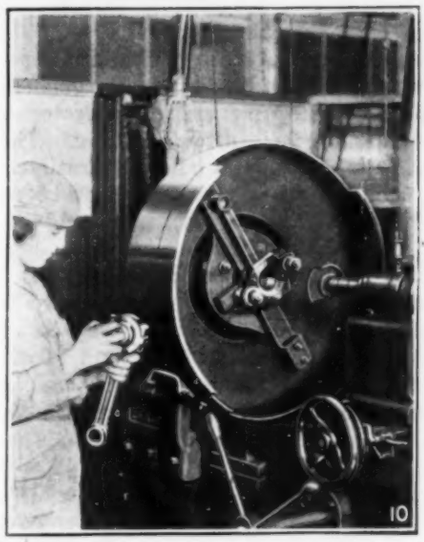






Then comes the drilling and reaming, Fig. 3, the milling of the edges, Fig. 4, and the profiling of the small end, Fig. 5. The cap is then sawed from the end of the rod and the flat surface finished by grinding, Fig. 6. The rod is located from the small end, and the other end is clamped so that the ground surface will be square in both directions.

The bores at both ends are then protected by suitable covering, and the outside of the rod is sandblasted, as in Fig. 7. The large end is then finish reamed, after which the rod goes to the grinders, where the bores



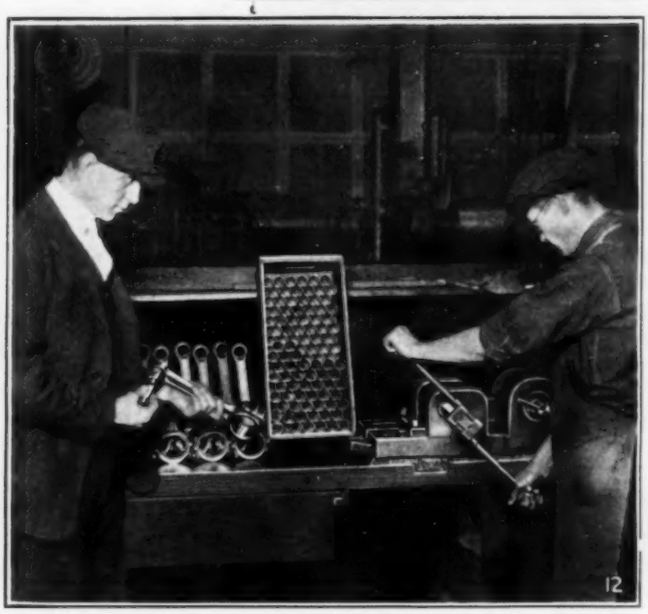


FIG. 7. SANDBLASTING THE RODS FOR FINISHING CHANNELS. FIG. 8. REAMING THE LARGE ENDS. FIG. 9. GRINDING THE SMALL END FOR BUSHING. FIG. 10. FIXTURE FOR GRINDING THE LARGE END. FIG. 11. FINISHING LARGE BEARING WITH PUSH BROACH. FIG. 12. REAMING AND TESTING THE SMALL END BEARING

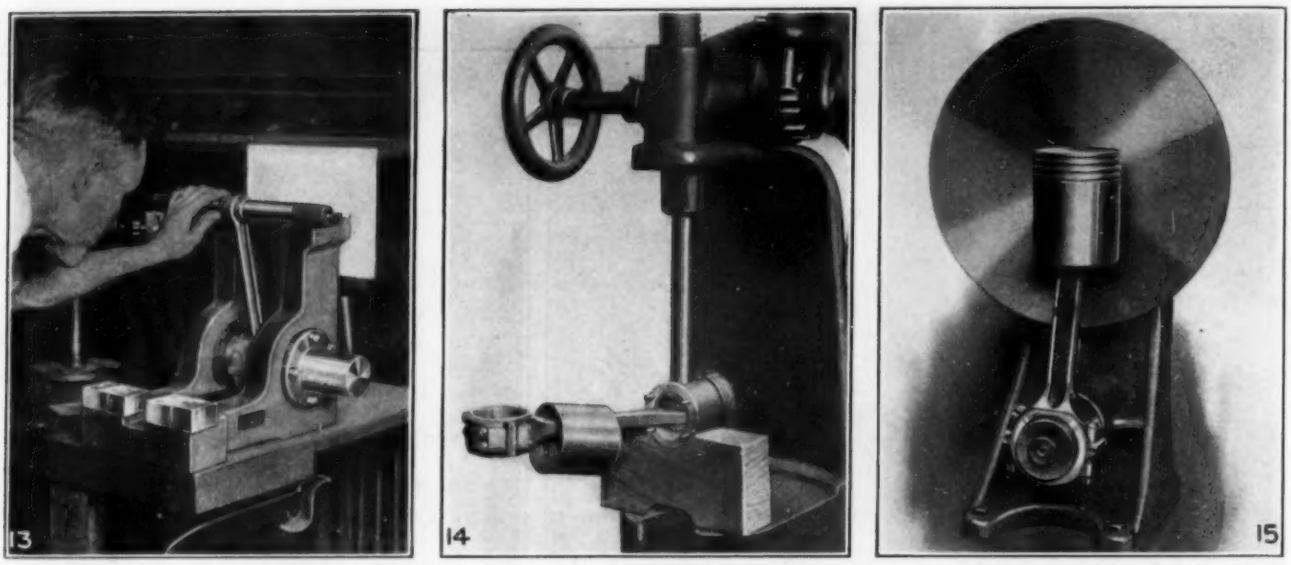


FIG. 13. TESTING ALIGNMENT OF RODS. FIG. 14. ASSEMBLING PISTON ON ROD. FIG. 15. TESTING SQUARENESS OF PISTON AND ROD

of both ends are finished, as in Figs. 9 and 10. These views show the kind of counterbalanced chuck used, and also the wheel guards which protect the workers while testing the hole after grinding. The guard is shown in both positions in both illustrations.

The finishing of the babbitted bearing surface is shown in Fig. 11, where a combined push broach and burnisher is used in a hand machine. Next, comes the final finishing of the bushing which goes in the small end, after which the rod is ready for inspection and assembly.

The fixture shown in Fig. 13 is of the usual type for inspecting the alignment of the piston pin with the crankpin bore. The white paper behind the gage aids in the visual inspection.

Assembling the Piston

The aluminum head and inner portion of the piston are assembled, as shown in Fig. 14. The piston carries a floating pin, which gives a snug fit in the aluminum portion. In order to assist in assembling, the piston is dipped in hot water which expands it sufficiently so that the pin can be easily pushed into place. Then when the aluminum expands from the heat of the motor, the fit of the piston pin will allow lubricant to enter without allowing too much play in the bearing.

The cast-iron skirt is then put in place over the aluminum body and is held by the four studs shown. The rod and piston are then tested for squareness, as shown in Fig. 15, the large circular plate making a very accurate method of showing variations.

An Appreciation of Chordal

By Sir Henry Fowler
Chief Mechanical Engineer, Midland Railway

Two years ago on Jan. 31, 1920, Chordal died, as recorded in the European edition of American Machinist in the issue of May 22, 1920, and in that issue you asked if there were any who would like to say a word or two with regard to him and his work. At the time I was unable to write as I hoped to do, thinking I would leave it until the next anniversary of his death; this too passed by without my doing so, but I do feel as one of your English readers, and one of the world-wide admirers of Chordal and his works, that I should like to write you hereon.

Chordal's Book

I first read Chordal's book considerably over 30 years ago and have ever since, in what I believe to be the best interests of "shopmen," been a "Chordal missionary." No one before had, I think, dealt with such subjects separately, and decidedly no one since has in one book given us so much common sense on shop management as he did. What he wrote then is applicable today, and in that I think is the proof of his greatness. Of the world-wide knowledge and appreciation of his writings I had a very marked example only four days ago, when I gave a lecture on shop management to the undergraduates of Cambridge University in connection with their engineering society; at dinner I met a friend of mine, who is a professor of engineering at a university in Australia, who asked me if he might come along and hear my talk. Early in the talk I mentioned Chordal and could see that I should have to be very sure of my quotations by the appreciative smile which appeared on the face of my Australian friend. As soon as I got off the platform he at once came up to me and said, "You know, like yourself, I am a Chordal enthusiast."

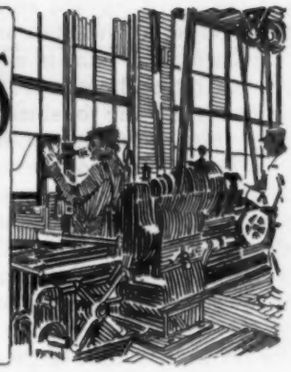
From what I have judged I am sure that in the States, like here, there is not a high enough appreciation of the indebtedness of those connected with engineering shops, to James W. See (Chordal).

When I first went to America 18 years ago, I made what was really a pilgrimage to Hamilton, Ohio, and I still hold as a treasured memory the conversation I there had with Mr. See. It was a matter of the deepest regret to me that when in the United States on an aeronautical mission in 1918, although I got to Dayton, it was only on the telephone and by correspondence that I was able to again get in touch with one I admired so much.

I do not feel it is necessary for me to apologize for raising this subject, but I should like your readers to know that here, as well as on your side, we appreciate so much the work of a great man.

MODERN PRODUCTION METHODS

By
W P. Basset
of
Miller, Franklin, Basset & Co



XXVII. Administrative Methods

System Aids Management But Does Not Necessarily Insure Profits—Advantages of Functional Organization—Periodical Reports Save Conference Time

BECAUSE the preceding articles in this series were given up to detailed descriptions of systems for finding costs, planning production and setting standards of production, I fear that some over enthusiastic readers may get the idea that that is all there is to managing a machine shop. Forms, systems and routine are a great help to management in any shop. In the small shop of perhaps twenty-five workmen or less, where the owner is in close contact with every man and every machine, the business may, perhaps, be successfully run without system. In the large shop, however, system and routine are essential, but I would be the last one to suggest that the seeker after modern methods should put any of the systems which are described in this book into effect in his factory and expect that the system would assure profits.

System an Aid to Management

Profits come from management, and it is only as system aids management that it is of value. No cut-and-dried method can safely be applied to all shops. In fact, I question whether it is so much the nature of the work in a shop, as it is the peculiarities of temperament of the management, which determines what form a system shall take.

The same considerations apply when we consider the form of organization by means of which the shop shall be managed. When I speak of form, I refer to the methods of organization known as functional or staff, line, and the combination of line and staff.

In the functional or staff form of organization, each activity of the business is under the supervision of a specialist. Thus, we have all purchasing handled by the purchasing agent and his aids; all production planned and routed by an expert production man, the cost finding done by a corps of cost clerks, under the supervision of a chief whose sole responsibility is the gathering of costs; and so on for each activity of the business. Under the complete Taylor system, which is the most minutely worked out staff form of management, there are eight bosses, not of departments of the plant, but of activities of the workmen. There is for instance a speed boss, an inspector, a gang boss, a repair boss and so on.

If we could conceive of say, an automobile shop organized under the line plan, we would find the foremen of the crankshaft department buying forgings for his product, planning the work through his department, gathering his costs, setting the rates of payment for his workmen, hiring and firing his men, and in general being a little czar as regards every activity of his department. Needless to say, in as highly developed an industry as the automotive industry, such an organization is unthinkable, but in many of the smaller shops it exists. This, of course, is because in the small shops the business cannot bear the charges of specialists who, because of the small amount of work handled by the shop, would be busy only a small part of their time.

The line and staff type of organization is perhaps the most common. This is a combination of the best points of the two preceding. As ordinarily found, as much of the specialized work as feasible is handled by staff men, the rest of the duties of management being handled by foremen of departments in the old-fashioned line method. The great majority of machine shops are organized under this type, carrying the functionalization idea as far as the individual shop can afford. It is only in the very small shops nowadays that we find the material line form of organization, and even there it is questionable whether what we find is not more or less a staff organization, where an individual, often the owner of the business, acts in the capacity of several staff men. In other words, in the small shop the owner or his superintendent is forced to be an expert on several phases of the business.

Types of Management

While the type of organization depends primarily upon the size of the business, the staff line-up is undoubtedly the best to be had. So we generally find that as a business develops from small to very large, it starts with the line organization and progresses through the line and staff to the staff type.

It is when more or less of the functions of a business are handled by individuals responsible only for that function, that the owner feels it necessary to call meetings of his executives. I do not believe that in managing a business, two or more heads are better than one. I believe that policies should be laid down and important decisions affecting the good of the entire business should be made by the individual rather than by leaving them to the wordy consideration of conferences. That, however, does not mean that it is

not necessary for the staff men in an organization to get together and discuss problems. For the very reason that each staff man is a highly trained expert in his branch, he is almost sure to be incapable of seeing the problems of the business as a whole. To the cost accountant, costs are an end in themselves, and rightly so. To the production man, the troubles of the sales department mean little or nothing and to the sales manager, problems of manufacture are looked upon as alibis for the factory's failure to make good his promises. None of these functional executives is aware of how his particular problems affect the financing of the business, which is the peculiar trouble of the treasurer.

Therefore, it is necessary that the considerations which affect the executives must be laid before someone, usually the president, who can balance one against the other and make a decision which will be for the best interests of the company as a whole. Much of the information which the president needs can be laid before him in the form of reports. In so far as this is possible, it does away with time wasted in conferences. I know that one purpose of the conference is to build up a human understanding between department heads whose interests sometimes clash. I doubt whether so much good will comes from the average conference as is thought. On the other hand, when these men are allowed to get together and argue their own points of view, they are apt to get more embroiled than they would if they never came in contact. I strongly recommend, therefore, that the chief executive of a business constantly plan to have the pertinent facts from each department laid before him by means of reports and, so far as possible, in this way reduce the time wasted in conference.

TO THE COST MAN, costs are an end in themselves, and rightly so. To the production man, the troubles of the sales department mean little or nothing and to the sales manager, problems of manufacture are looked upon as alibis for the factory's failure to make good his promises. None of these functional executives is aware of how his particular problems affect the financing of the business, which is the particular trouble of the treasurer.

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What such reports shall be is largely outlined in the preceding chapters. Certainly, a chief executive who endeavors to keep fairly close to his business should get monthly statements from the cost department, showing the profit and loss by lines. Very likely, he will want a statement of condition of the company each month. He will also want to see a statement showing how closely to normal the operational cost in each productive department is running. If the actual cost is abnormally large, he must know the condition and why it is so. Perhaps he will care to dig into the matter far enough so that he will be warranted in looking over the expense analyses for all departments, both the contributory and the productive. He will probably want a statement showing him the proportion of productive and non-productive payroll, the average earnings per man by departments, and the labor turnover. This and perhaps other reports he will want from the cost department.

From the production department, he should get a concise statement of the activity of the productive departments as scheduled for perhaps two months in advance. This will show him how well the sales department is keeping the factory in balance. It will show on what products the sales department should concentrate in order to load up those departments where inactivity is likely to occur in the future, and it will show him on which products the sales department may lessen the pressure somewhat. Reports of this sort may also indicate the advisability of additions to plant or of adding new lines of product to maintain machine activity.

Against these reports of the cost and production departments, he will wish to compare reports from the sales department. These reports have not been discussed in this series for obvious reasons. In the first place, but few concerns have more than a hazy conception of the conditions in the market. Business is, as a rule, either "rotten" or "booming." The more delicate shadings of marketing and the probable trends are little known. However, most concerns do build up reports showing the orders on hand for the different lines of product. If these were amplified to include also those changes in demand which the sensitive sales department should be able to gage quite closely, it would be possible to effect considerable economies in manufacturing and to be among the first to reap profits from changing conditions. As it is, we usually find that changing conditions are not sensed until they have become the existing conditions.

With all of these reports from the cost department, the planning department and the sales department at hand, the chief executive is in a position to dictate to his executives the policies of the company and to point out how each executive's activities will be affected thereby. Actually, of course, in the individual concerns, the chief executive may feel it is safe to turn over all or part of this work directly to the executives concerned. For instance, where good feeling and a wholehearted regard for the good of the business as a whole exist, it is possible for the treasurer, the sales manager and the production manager to get together and settle upon what shall be made, how much of it shall be made and when it shall be made. This is done in the light of the knowledge of plant capacity brought to the meeting by the production man, the possibility of selling the goods of which the sales manager should have specialized knowledge and the ability to finance production as seen by the treasurer. Perhaps still other groups of executives may well get together, but when they do, it should be because as a group, they are able to consider the problems in the cold, unemotional manner which it is assumed the chief executive bears to his business.

What reports shall go to the lesser executives of the business can hardly be touched upon, for the needs of each business and the duties of the individual executive vary so greatly that it would be difficult to lay down

a rule. However, I believe that in most machine shops it is well to give the foreman of each department, whether contributory or productive, a copy of the expense analysis of his department. This shows him in cold figures whether the efficiency of his department is increasing or decreasing. Not only that, it shows him on just which items he is improving or falling down. If he is a thoughtful man, and if the expense analysis is drawn up in the manner described in earlier chapters of this series, he will often see places where betterments can be made. Actually, this report will give information which in the ordinary factory goes to the foreman in the form of several separate reports. It will show him, for instance, an itemized list of the non-productive labor which he has used. It will show him how much his productive payroll has been and what the percentage of productive and non-productive labor is. It will show him the labor charge per productive hour. In short, it gives the foreman all of the information that he needs about his department. The expense analysis is to the foreman who considers his department as a little business, what the statement of profit and loss by lines is to the chief executive.

Reports, it must be remembered, are, after all, but an unsatisfactory sort of make-shift to take the place in the large organization, of the personal contact and first-hand knowledge that the owner of a small concern has of what goes on in his shop. There is the danger that reports will come to be looked upon as having some mysterious power to make profits. The management of a shop must never get so enthusiastic over modern methods that it forgets that profits can only be made by selling a product for more than it costs to produce it.

Abuse of Free Service

BY A. J. SCHNEIDER
Cincinnati Planer Co.

In answer to your editorial on page 361, of Vol. 55, I am sending to you two sample forms used by the Cincinnati Planer Co. for service and inspection of planers and boring mills. This policy is in line with your idea that machine tool service should be charged and paid for just as any other service is charged and paid for.

People who abuse the "service" idea and make a big noise about it, should remember that after all the machine that requires the least service is usually the best. If you can buy a machine and then forget about the service you are extremely lucky or wise. There are however, many machines that require service and inspection by experts at regular periods. This, if done right, is real economy and good business for both producer and user.

This company has for about ten years been paying without complaint for service and inspection on office mechanical equipment. Our machines are always in good running order and the operators thoroughly posted up to date on how to get the best results without abusing the machines.

Possibly the greatest benefit of an "inspection and service" system is the training given the operator. Much less service would be required on any kind of machine, if only first class operators were employed.

THE CINCINNATI PLANER CO.
PLANERS & BORING MILLS
CINCINNATI, O. U.S.A.

Gentlemen:-

Have you ever figured the loss of the Shut-Downs on your Planers and Boring Mills?

These are big expensive machines, and when they are out of commission, the whole shop production suffers.

The loss can be greatly reduced by a regular system of Inspection, which we have inaugurated, one of our Experts going over your machines carefully every sixty (60) days, the expense being so small, that not a single user of our machines can afford to be without this Service.

Poor belt conditions, improper gib adjustments, wrong feeds, and speeds, defective oiling facilities, general abuse of the machine, efficiency of the operator, will all be noted in the Inspector's report, copy of which you will receive after each inspection.

The saving in depreciation of your machines alone, will more than pay for this Service, and to have them kept in first-class condition at all times, will make you thousands of dollars.

We know this is just the kind of Service our customers have been looking for, and we will be glad to have you sign the enclosed contract, returning the original to us, keeping the copy for your files.

Hoping you will join us in this proposition, we are,

Yours very truly,

THE CINCINNATI PLANER COMPANY.

R.A. Endebrock

RS:KB
Encls.

CONTRACT

Cincinnati Planer & Boring Mill Inspection Service.

THE CINCINNATI PLANER COMPANY, CINCINNATI, OHIO.

Date,_____

It is agreed that the Cincinnati Planer Co. of Cincinnati, is to send an inspector to the shop of the undersigned every sixty (60) days, for a period of one year, who will inspect thoroughly all Cincinnati Planers and Boring Mills and furnish a written report after each inspection.

This contract does not cover repair parts or work made necessary by either wear or accident, excepting minor adjustments made at the regular time of inspection.

This agreement shall continue in force for one year and shall renew itself automatically until cancelled in writing by either party.

SCHEDULE OF PRICES FOR INSPECTION SERVICE:

To users of (1) Cincinnati Planer or Boring Mill—$ 50.00 per year
" " " (2 to 5) " " " " " — 75.00 " "
" " " (6 or more) " " " " " — 100.00 " "

This contract is contingent upon our securing a sufficient number of clients to make it possible to render the above service at the very low prices scheduled.

_____
FIRM

By_____
OFFICIAL CAPACITY

_____
STREET ADDRESS

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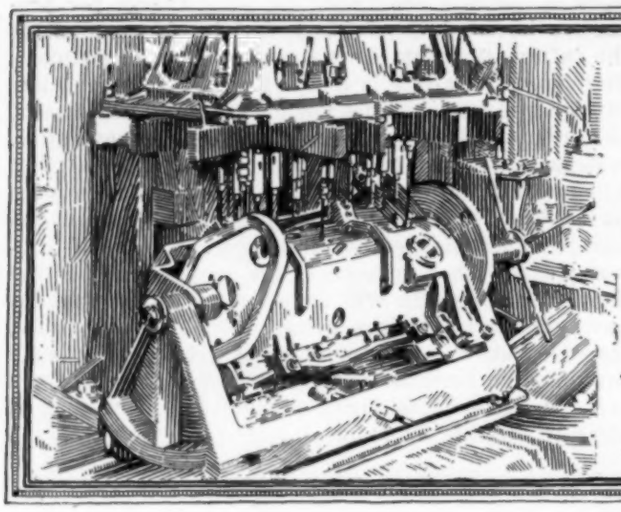
CITY

THE CINCINNATI PLANER COMPANY,

By_____



Tool Engineering

By
Albert A. Dowd and Frank W. Curtis
President and Chief Engineer
Dowd Engineering Company, New York City

Design of Cross-Slide Tools for Lathes—Types and Proportions of Toolholders and Blocks—Methods of Clamping and Adjusting Tools

IN CONNECTION with turning and boring operations with tools attached to the turret, work is also performed by cross-slide tools, oftentimes used simultaneously. Forming, facing, grooving and cutting-off operations are usually done by tools on the cross-slide of the machine. There is obviously a great saving in production time when combinations of operations can be made; but in order to obtain maximum efficiency from the tooling, both turret and cross-slide tools must be designed so that there will be no interferences to prevent them from being used at the same time. Cases are occasionally found where the tools must be operated separately, but this method can nearly always be avoided by a careful study of the various cuts to be made and a consistent tool application.

The different movements of both turret and cross-slide must be considered when designing tools. The positions of the tools and their relations, not only to each other but to the work, are of great importance. A turret layout showing all tools in position will be found a great help in avoiding interferences. When machining short work which requires short turret tools, there is not likely to be very much trouble, but when long boring bars or turning tools are used, there are chances for interference. It is not at all difficult to avoid trouble between tools that are working simultaneously; it is the idle tools that project from the turret at various angles that are apt to do the damage.

The diagram shown in Fig. 339 illustrates a common source of trouble caused by tool interferences. In this example the work *A* is quite long and projects some distance from the face of the chuck. It is to be bored and reamed with turret tools and faced with special cross-slide tools as indicated, the roughing tools being at the front of the machine and the finishing tools at the rear. The work is held in special chuck jaws cut away so that the back-facing tools can operate without interference. The boring bars *B* and *G* are long in order to pilot them in a bushing in the chuck and thus give greater rigidity. The reamer bar *F* is arranged so that it will "float," but it is also piloted in the same manner as the boring bars. The front cross-slide toolblock *E* has two tools *C* and *D*, used for rough-facing both sides of the flange. The rear toolblock *H* contains two finishing tools as indicated.

The tool designer can easily design these various tools so that each is apparently all right for the purpose, yet when in use on the machine there would be an interference with the front cross-slide toolblock by the reamer bar *F* at the time when the rear cross-slide tools are finishing the flange. This action is shown in the diagram. There is a very simple way out of the difficulty, either by placing the tools in every alternate turret hole, or by cutting away the toolblock a trifle as shown at *K*. If it were necessary to use several other turret tools in the same set-up, the condition would be more serious, but some way out of the trouble could be found by careful study.

Another situation which is sometimes troublesome on certain types of turret lathes, is the interference of long boring bars with the "spider" or spoke wheel used for the longitudinal movement of the turret slide. To avoid this trouble, an extra long pinion shaft and a special bracket to carry it may be required. Some turret lathes have the turret set at an angle, so that as it is indexed the tools swing clear of the spider. Other machines avoid the possibility of trouble of this sort by doing away with the spider entirely and using a hand-wheel in place of it. The diameter of the wheel is small enough, so that it does not interfere.

The greatest care should be taken by the designer to look into the various points mentioned and see that there is no possibility of one tool striking another or hitting any part of the machine, either during the machining operations or while indexing the turret. The layout of tools showing all turret and cross-slide tools in their operating positions is of great value in preventing any interferences. The matter of turret layouts will be fully discussed later in the series.

The following points of design are of importance and should be considered:

(1) The quantity of pieces to be manufactured is a factor of great importance, as it controls the cost of the tool equipment. Naturally, a small number of parts requires inexpensive tooling, and tools of standard form should be adopted for this kind of work wherever possible. In high production the special tooling expense

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need not be considered very carefully, the great factor being a reduction of time in the process of machining. Hence, special tools designed for high production should be so arranged that they can be readily replaced when worn, easily set and conveniently adjusted.

(2) The material to be machined must be considered when designing cross-slide tools, in order to obtain the easiest cutting action and the removal of the stock in the best manner. For example, cast iron and other materials of short grain can be machined with blunt tools, or those which do not have any "lip." Copper, steel and some aluminum alloys require tools of such a nature that they produce a shearing action on the materials. Occasionally this point affects the design of the toolholder, making it desirable to set it at an angle rather than straight. It is therefore advisable to consider the material to be cut before starting the design.

(3) The cutting action of cross-slide tools makes it necessary to hold them with exceptional rigidity in the tool supports. In forming cuts it is very important,

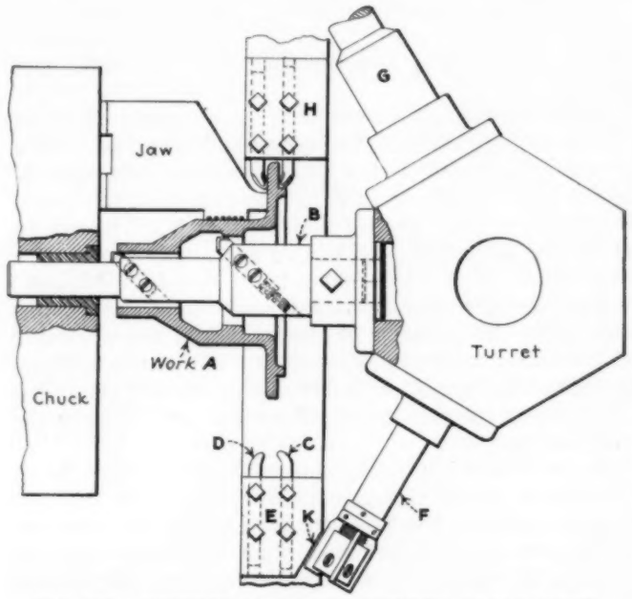


FIG. 339. INTERFERENCE OF TURRET TOOLS WITH CROSS-SLIDE TOOLBLOCK

and also in cutting-off operations. When facing cuts are to be taken, the action is not as severe as when cutting directly down into the body of the metal; nevertheless tools must be held with sufficient firmness, so that no "chatter" will develop. It is advisable to use tool sections as large as possible, in order that the heat generated by the cut will be carried away rapidly.

(4) The method of adjustment of the tools should receive thought. The "sledge-hammer" method of adjustment is crude and out-of-date. Accurate work requires that proper provision be made for easy and accurate setting of tools. When multiple toolblocks are used, as when several shoulders are to be held closely to size, it may be necessary to grind the sides of the tools and fit them accurately to slots in the blocks. Holding-down screws and adjusting screws should both be arranged with regard to the convenience of the operator. They may be operated by a wrench, if desired. Some operators prefer a screwdriver for adjusting screws, while others like a wrench. The designer may be governed by the practice in the shop which is to use the tools.

In order to obtain maximum efficiency from cutting tools, they must be so supported and held that there will be no chance for chatter. The diagrams shown in Fig.

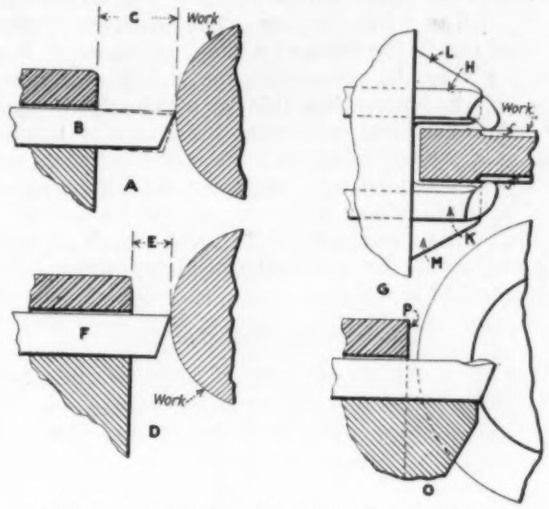


FIG. 340. IMPORTANCE OF TOOL SUPPORT

340 illustrate some important points in connection with tool support. In the example *A* the tool *B* extends beyond its support a distance represented by the letter *C*. If the work which is to be done does not require a heavy cut, this amount of overhang might not cause any difficulty. On the other hand, if the cutting action is severe the tool might be depressed, as shown by the dotted lines, thus causing chatter and injury to both tool and work.

In the example shown at *D*, the tool *F* overhangs beyond the block only the distance *E*. This arrangement would be much better for heavy cutting than the example *A*. The nature of the work and the kind of cut required make a considerable difference in the amount of overhang permissible. A parting tool must necessarily overhang sufficiently so that it will cut off the work without interference by the toolblock against the side of the work. For this reason, a parting tool should be made deep in order that the tool itself will have sufficient rigidity to withstand the pressure of the cut.

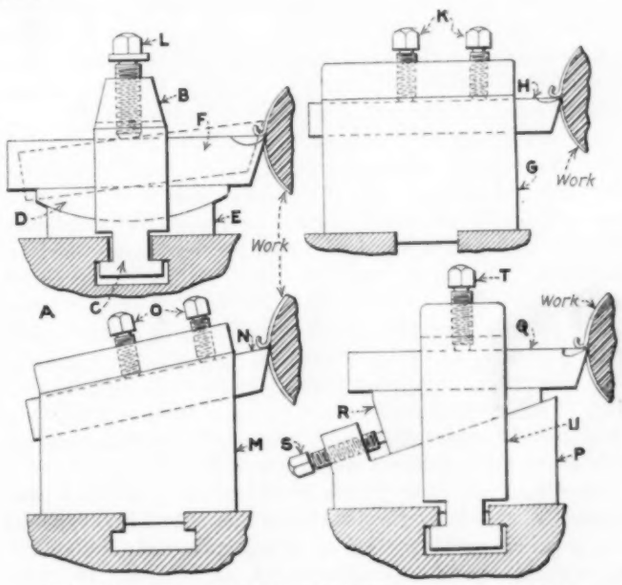


FIG. 341. CROSS-SLIDE TOOLPOSTS AND BLOCKS

In the example shown at *G* the two tools *H* and *K* are used for facing the sides of the work, as indicated. As the tools project beyond the holder some distance, it is advisable to support them in some way so that they will not deflect while cutting. The toolblock is therefore built out in the form of a shelf, as shown at *L* and *M*, thus giving the necessary support. A side view of the toolblock illustrating this point clearly is shown at *O*. An additional refinement for a case of this kind would be a projection of the cap block *P* of such shape that it would extend out over the tool, and permit the use of a holding-down screw as far out on the tool as possible. These points in tool support are all of importance and should be carefully considered when designing cross-slide toolblocks.

Cross-Slide Toolblocks

There are a number of styles of toolblocks in common use on both turret and engine-lathe cross-slides. Several of these types are illustrated in Fig. 341. The

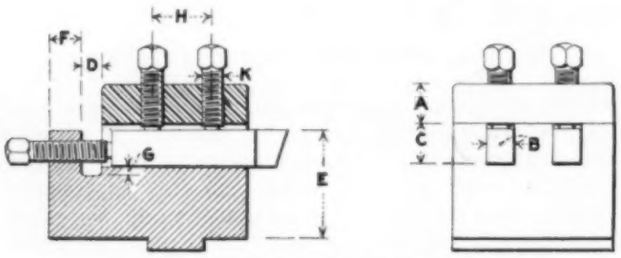


FIG. 342. TOOLBLOCK PROPORTIONS

A—Front toolblock with tools up to $\frac{1}{2}$ in. wide: $A = 1$ in.
Tools up to 1 in. wide: $A = 1\frac{1}{4}$.
Rear toolblock with tools up to $\frac{1}{2}$ in. wide: $A = 1\frac{1}{4}$.
Tools up to 1 in. wide: $A = 1\frac{1}{2}$.
B—Tools up to $\frac{1}{2}$ in. wide: $B = \frac{1}{64}$ in. plus width of tool.
Tools $\frac{1}{2}$ in. and over: $B = \frac{1}{32}$ in. plus width of tool.
C—Tools up to $\frac{1}{2}$ in. height: $C = \frac{1}{32}$ plus height of tool.
Tools $\frac{1}{2}$ in. height and over: $C = \frac{1}{16}$ in. plus height of tool.
D—$\frac{3}{4}$ to $\frac{7}{8}$ in. on all toolblocks when designed with block-adjusting screw, as shown.
E—This dimension is always to be shown on assembly drawing, and is the dimension to center line of spindle.
F—Tools up to $\frac{1}{2}$ in. wide: $F = 1$ in.
Tools over $\frac{1}{2}$ in. wide: $F = 1\frac{1}{2}$.
G—$\frac{1}{8}$ to $\frac{1}{4}$ in. clearance.
H—Four times the diameter of *K*.
K—The diameter of screw.

example *A* shows a form of toolpost in common use on both engine and turret lathes. This form is familiar to all shop men and designers. The post *B* is circular in form and fits the T-slot in the cross-slide at *C*. The tool *F* rests on a rocker *D* supported on the curved surface of the collar *E*. The tool is held in place after adjustment by means of a collar-head setscrew *L*.

One advantage of this type of holder is that it permits the tool to be set either above or below center, as indicated by the dotted line. For this reason it is commonly used on an engine lathe, as tools vary in depth considerably and a vertical adjustment of some sort is essential. For single cuts on turret lathes this type of holder can often be used to advantage, and for very heavy cutting two toolposts can be used in combination with a long tool, thus obtaining exceptional rigidity. For operations requiring two or more tools and in cutting shoulder distances close to size, toolposts of this kind are not generally used in high-production work, as it is much more difficult to preserve the setting.

Another type of toolblock in which the tool is set permanently at an angle is shown at *N*. This type is useful when cutting steel or other materials which require the tool to be set at an angle or "lipped" to make the cutting action easier. The block is usually of cast iron, while the cap is of steel. Two setscrews *O* are used to hold the tool in place. This is a very simple

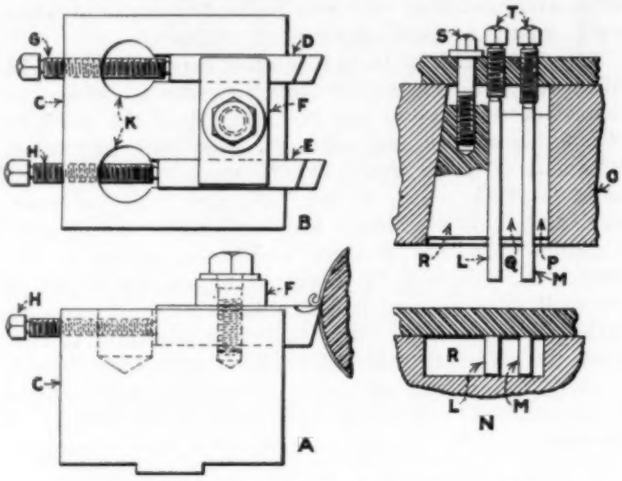


FIG. 343. METHODS OF CLAMPING TOOLS

type of block, and no setscrew is provided for adjusting the tool.

Another example, shown at *G*, is a simple cast-iron block fitted to the T-slot on the cross-slide and held down by means of bolts in the usual manner. The tool *H* in this case is set straight on the center of the work. It is held in place by two setscrews at *K*. The cap in which the setscrews are located is usually made of a steel block. This block should be of sufficient thickness to give a good thread for the setscrews and at the same time resist the pressure of the screw. When a number of tools are used in the same block, care should be taken to make the cap of sufficient depth to withstand the pressure of the numerous setscrews used to hold the tools in place.

An example of an adjustable toolblock is shown at *P*. This block passes through a slot in the post *U*. The latter is fitted to the T-slot in the cross-slide. The tool *Q* rests on a wedge-shaped piece *R*, which may be adjusted by means of a setscrew *S*. The tool is held

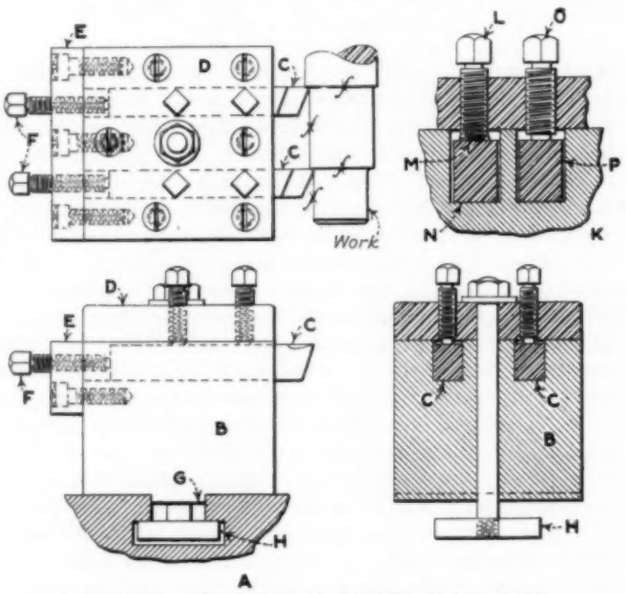


FIG. 344. TOOLBLOCKS WITH PROVISIONS FOR ADJUSTMENT

in place and the entire unit clamped by means of the screw *T*. This toolpost allows the tool to be raised or lowered without difficulty according to the adjustment of the taper block *R*. There is no provision for tipping the tool, as in the example *A*. All of the blocks shown in this illustration are of use for various kinds of work, and they can be adapted to a variety of conditions. In Fig. 342 is shown a diagram of a simple form of toolblock with the proportions of the various parts. This data will be found useful in proportioning toolblocks for ordinary work, and the standard sizes given can be used as a guide when designing. No particular instructions are required for using this information, as the chart is self-explanatory.

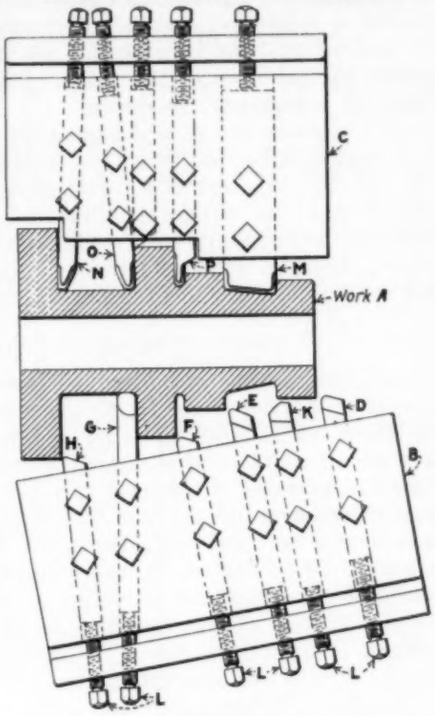


FIG. 345. MULTIPLE TOOLBLOCK FOR CLUSTER GEAR

The importance of an efficient method of holding a tool in position and adjusting it, has already been mentioned. Several examples which illustrate methods useful for this purpose are shown in Fig. 343. The illustrations at *A* and *B* show, respectively, a side and top view of a simple form of toolblock *C*. The tools *D* and *E* are set in slots in the block, and the method of clamping is by means of a single strap *F* having a screw through it midway between the two tools. Adjustment is provided in the setscrews *G* and *H*. Clearance holes are drilled at *K* in order to make it easy to plane out the tool slots.

For light cutting and when only two tools are to be held, this type of block will be found convenient and economical, as it can be made up cheaply and does not require an upper cap or plate. If the cutting action is severe, the same type of block can be used, except that it should be made deeper and the tools longer, so that two straps instead of one can be used for holding and clamping tools. It is advisable to place the forward clamp as close to the front end of the block as possible, when two clamps are used.

In designing toolblocks for grooving tools, a confined situation may require extraordinary methods of holding and clamping. An example which illustrates this point is shown at *N*. The two tools *L* and *M* are used for grooving, and are set in the block *O* with spacers *P* and *Q* of proper size to locate the tools in their correct positions. The adjusting screws at *T* can be set up to regulate the depth of the cut. The peculiar part of this toolholder is in the method of clamping, which is done by means of a wedge *R*. This wedge is operated by means of a special screw *S;* the action of the wedge causing the tools to be firmly gripped between the wedge, the filler blocks *P* and *Q* and the edge of the slot in the toolblock. In adjusting the tools, the wedge may be slightly loosened, if necessary, and adjustment made before tightening. In many cases it is unnecessary to disturb the screw *S*, as sufficient pressure can be brought to bear on the adjusting screws *T* to make the correct setting.

In Fig. 344 is shown a type of toolblock at *A* designed particularly for turning two diameters. The tools *C* are held in slots in a cast-iron block *B* by means of square-head setscrews. A steel plate *D* acts as a cap on the top of the block; and the diameter adjustments are made by means of setscrews *F*, which are held in a strap *E* at the back of the block. This holder represents a simple form which has the advantage of being made up cheaply, as it is a built-up type which does not necessarily require any pattern, yet it is thoroughly substantial and will give good results. There are numerous cases where a design of this sort will be found convenient, not only for turning operations but for grooving or forming. It is only necessary to proportion it to the work for which it is to be used, and provide the slots for the necessary tools, together with the methods of holding and adjusting.

Locating and holding the block down on the cross-slide are accomplished by means of the tongue *G* which enters the T-slot. The shoe *H* is used to draw the block down firmly by means of a bolt which extends entirely through the block. The shoe is a simple strap of proper size to fit the T-slot; it is usually standardized, and often made up in quantity.

The type of setscrew used to hold down a tool is quite important, and the material from which it is composed should also be given consideration. In the section at *K* the tool *N* is held in place by means of a plain square-head setscrew at *L*. The end of this screw *M* is likely to become enlarged by use or abuse until it is very difficult to operate it if made in the manner

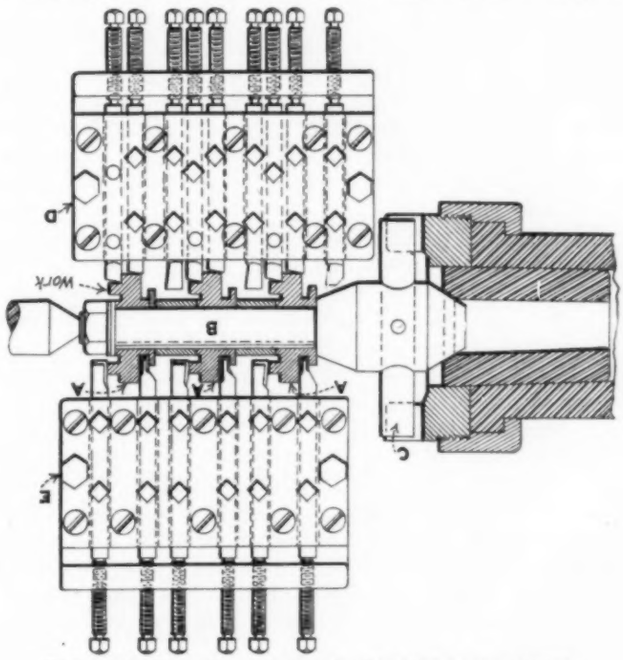


FIG. 346. FRONT AND REAR TOOLBLOCKS WITH MULTIPLE GANG TOOLS

shown. The tool *P* is held by a square-head setscrew *O*, and the end which bears against the tool is relieved, so that under no circumstances can it be distorted so as to cause trouble.

Setscrews should always be hardened, and for severe service the material from which they are composed should be considered. The authors have found Hy-ten steel exceptionally well suited for setscrews subject to hard usage. Tool steel is also used, but considerable care should be taken to draw the temper sufficiently, so that it will not be brittle.

An important point in designing toolblocks in connection with the setscrews used to hold the tools in place, is the amount of thread which the setscrews should have in the cap or block. In general, the diameter multiplied by 2 will be found sufficient, but a little more than this is an advantage in the majority of cases. Some of the points mentioned here may be thought by the tool designer to be more or less unimportant. It must be remembered, however, that care taken in the design will result in much less trouble in the factory, and the tools will stand up and produce the work much better than if some of these small details are overlooked or neglected.

Multiple Toolblocks

In the design of multiple toolblocks for the cross-slide of either a turret or engine lathe, the work which is to be done naturally affects the design strongly. Occasionally, cross-slide tools are used for turning various diameters, and at other times only for facing, grooving or cutting off. There are cases when the front toolblock is used for turning, while the rear toolblock may be utilized for forming or grooving. In general, when roughing and finishing cuts are made by the front and rear toolblocks working one after the other, the front block is used for roughing while the rear is used for finishing. There is a reason for this, as the cutting action on the front block is downward against the body of the cross-slide. Therefore, it is more suited to heavy cutting. The rear block, on the other hand, is subjected to a lifting action which makes it advisable to use it for lighter cutting.

An example which illustrates one use of multiple toolblocks on the front and rear of the cross-slide is shown in Fig. 345. The front block *B* carries the tools *D*, *E*, *F*, *G* and *H*. All these tools are used for turning the various diameters, according to their positions. The tool K is a chamfering tool, and simply breaks the corner of one of the gears after the turning operations have been finished. All of the turning tools are arranged so that they are operating simultaneously, thus saving a great amount of time in production. The toolblock in *B* in which they are held is of a simple type, containing slots properly spaced to hold the tools. All adjustments are made by means of the setscrews shown at L. The block is set at an angle in order to avoid too much overhang for the tools cutting on the small end of the work.

The rear toolblock *C* contains tools *M*, *N*, *O* and *P*, all of which are used for sizing the shoulders, facing or grooving. None of the tools in the rear block are used for turning, but an important point is the fact that the spacing is such that shoulder distances are accurately cut and sized. The construction of the rear block is similar to that used at the front. Setscrews are provided for adjustment, as shown.

These toolblocks are both designed for use on a heavy-duty engine lathe, but it will be possible to use something of the same sort on a turret lathe when the cross-slide is provided with a longitudinal feed. It would doubtless be necessary to provide accurate longitudinal stops if used on a turret lathe, in order to make sure that the shoulder distances are held accurately to size.

Example of Multiple Cutting

Considerable time can often be saved by machining several cylindrical pieces in the same setting by grouping them together on an arbor and providing a gang of tools of suitable size and arrangement. Fig. 346 shows an example of this sort in which three pieces of work *A* are held on an arbor *B* with a special driver *C* in a slot in the faceplate. The other end of the arbor is supported on the center, as indicated. The work is placed on the arbor and driven by means of a key in a keyway in the work. Spacing collars are interposed between the various pieces in order to allow room enough for the various tools to operate.

The front toolblock *D* contains a group of turning tools, the operation of which is somewhat out of the ordinary. The two principal diameters of each piece are turned by a longitudinal feeding movement of the cross-slide in one direction. The small shoulder is turned by other tools by feeding the cross-slide in the reverse direction. The rear toolblock *E* contains a group of tools used only for grooving and facing. As these tools are set accurately, the various shoulder distances and faces are accurately preserved. In both blocks accurate adjustment is provided by means of backing-up screws.

In many cases where work of this kind is to be done it would be necessary to provide the block with accurately sized slots, and the tools would need to be ground on the sides to fit these slots. This can sometimes be avoided by using a special tool-setting gage, which can be arranged as a part of the block or can be a separate unit. The design of a gage of this sort will depend entirely upon the nature of the work. The ingenuity of the designer will be called into play to look into such points as this and provide means for accurate setting.

Very frequently the matter of tool setting is not considered carefully; and as a result when the blocks are placed in the shop the operator is compelled to waste a great deal of time in setting up the tools, and "cutting and trying" until they produce the work according to requirements. The careful designer considers the operator when designing and provides all necessary adjustments, together with means of setting up the tools so that they do not cause trouble when placed in the shop.

Grinding Practice in Great Britain

Increased Use of Grinding Process in Railway Field—Application in Other Fields—Specifications of Wheels Used in Many Kinds of Work—Production Figures

By I. WILLIAM CHUBB
Editor, European Edition, AMERICAN MACHINIST

BEFORE giving a few figures as to output obtained in current precision grinding practice in Great Britain, it will perhaps be well to mention that probably the most promising field for its development at the moment is the railway world. During the last two or three years a number of railway engineers have given their minds to this process of manufacture as compared with others, and have placed a few orders. But the railway engineer here is in a number of cases usually conservative and does not move until he is quite convinced. Further than that the shadow of amalgamation of the lines induces hesitancy in expenditure. One of its most recent and most successful applications to railway work has been the grinding of axles especially the journals for passenger coaches and wagons. One line has fitted up an experimental train with all axle journals ground.

IN GREAT BRITAIN the grinding process is now being used extensively on passenger car axles (particularly the journals), crosshead guide bars, links, piston rods, chilled rolls, granite rolls, brass rolls, rubber rolls, paper rolls, crankshafts, camshafts, piston rings, planer knives, ball race rings, aluminum pistons, lenses, plate glass edges, glass tubes.

Experiments are being carried out on the grinding of cylinders for locomotive and other engines.

The Churchill Machine Tool Co., Ltd., now almost the only specialist in precision grinding machines in Great Britain has supplied grinding machines for this purpose with special wheels to produce a semi-burnished finish and to secure a greater accuracy in roundness and parallelism than is possible with the mechanically-burnished journal. Radius link grinding machines for locomotive work have of course long been built in Great Britain, and further interest is being promoted in these machines, of both vertical and horizontal spindle types. The choice seems to rest with the railway company concerned and all parts of link motion work either are ground or are considered for that process. Locomotive piston rod grinding machines are also being employed. As to the grinding of locomotive engine and similar cylinders, this is a matter which is on trial. The writer believes that two companies are testing the ground cylinder against the bored cylinder from the point of view of wear. The railway companies have taken a considerable interest in the heavy face-grinding machine with wheels 30 in. and larger in diameter. Face-grinding machines with wheels up to 52 in. in diameter and with moving wheel or moving table also are being employed.

Grinding Chilled Rolls

A further important development is in connection with the grinding of chilled rolls. The depth of chill usually does not exceed 1 in. Truing the roll by the ordinary turning process in the lathe necessarily means getting well below the skin, so that a considerable proportion of the chilled part is removed and the life of the roll is materially shortened. On the other hand, in grinding the minimum for trueness only need be removed. One of the troubles has been in the production of the necessary camber, but the firm mentioned before is now able—it is perhaps alone in this—to provide machines with motion producing from the maximum camber required down to a parallel roll, without the provision of other camber bars.

Carborundum wheels have been used on this work. Their size is 20 x 2 x 8 in. They are of fairly coarse grit and soft grade and have been used on rolls 4 ft. 6 in. long and 12 and 14 in. in diameter, removing from $\frac{1}{16}$ in. to $\frac{3}{32}$ in. and, after truing, finishing with mirror finish in 1½ hours. The wheel speed employed was 5,000 r.p.m. and the work speed 100 ft. per minute. With the wheels mentioned the machines have to be particularly rigid. It may be mentioned that the Churchill company has recently finished a 36-in. x 18-ft. machine, and is at the moment of writing completing a larger machine, 48 in. x 24 ft. Granite rolls are now in many cases being ground in much the same way as that just described for chilled iron rolls.

The modern machine tool having had its best market of late years in the motor industry, it is not difficult to find here many instances of grinding. Thus the writer has particulars of aloxite wheels, 20 in. in diameter by 3½ in. thick, roughing out 24 four-throw cranks in eight hours. The stock removed was 0.010 in., the wheel being dressed up twice. Again, in grinding crankshafts a comparatively coarse wheel of this size is employed, a number of crankshafts being roughed-out with a fairly heavy cut and then finished with the same wheel, re-trued with a diamond, taking off fine cuts, say about half a thousandth, until the size is obtained. For roughing work truing is done by passing the diamond rapidly across the face, taking a deeper cut; in the finishing process light traversing cuts are taken with the diamond.

Feeding Directly In

Wheels of the same material on steel differential gear crosses have been used to grind the four taper points to limits of 0.001 in. on the diameter, $\frac{3}{8}$ in. by 1$\frac{3}{8}$ in. long. The wheel is 1¾ in. wide and is fed into the work, without traverse either to wheel or job. With wheels 18 x 2 x 5 in., coarse grit and hard grade, motor axle pins of chrome nickel steel, 3½ x 21 in., are ground, the wheel removing ¼ in. of stock after being re-trued for finishing. The time taken is 1 hr. 20 min. The same wheel is also used on pins 41 in. long, removing ¼ in. of stock.

As an example of wide face and forming cuts on motor axles, similar wheels 18 x 6 x 5 in. of medium grade have been found satisfactory either for taper or parallel work,

the wheel being fed straight in without traverse. As to cam grinding, the case of a wheel 14 x 2 x 7 in. on camshafts of nickel steel for petrol engines used on 3-ton lorries may be mentioned. After turning, the cams are 2 in. in diameter. They are then ground to correct size, 10 min. for each cam, eight cams being on each shaft.

Another wheel 18 x 2 x 5 in. is used for grinding piston rods of 0.4 carbon steel, 3 ft. 6 in. long and 3 in. in diameter. Material is removed by cuts of 0.002 in. until about 0.002 in. is left for finishing, this being taken off in half-thousandths. Some twelve to fifteen thousandths are left on after turning. The tolerance is 0.0005 in., and the production rate five rods an hour. For grinding cast-iron piston rings a carborundum wheel 14 x 1 x 7 in. has been used on rings 8 in. in diameter by $\frac{3}{8}$ in. wide by $\frac{1}{16}$ in. radial depth, removing 0.006 in., the production being twenty rings per hour with a tolerance of 0.00025 in. For general work a surface speed of about 5,000 ft. per minute has been found suitable, both for rough-grinding wheels and for cylindrical grinding, but in some cases the users prefer to run wheels at 6,000 ft. per minute, and in that case the wheels are, say two grades softer.

For surface grinding the Carborundum Company in Great Britain finds that with Pratt & Whitney grinding machines the speed should be somewhat lower than is usually specified, that is, it should be say 3,500 ft. per minute instead of 4,000 ft., giving on a 14-in. cup wheel 950 r.p.m. instead of something near 1,100 r.p.m. For cutting off steel bars, etc., the Carborundum Company runs wheels at 8,000 to 9,000 ft. per minute. But machines often run at lower speeds, even down to 4,000 ft. For wheels for grinding guillotine and planer knives the surface speed is about 2,300 ft. per minute. One record with a Seybold machine, using a wheel 30 in. in diameter gives the speed for a wheel $1\frac{1}{2}$ in. thick as 425 r.p.m. and for a wheel $1\frac{1}{4}$ in. thick 350 r.p.m. Spectacle glasses have been edged by hand with wheels running at 1,300 to 1,400 ft. per minute. No general rule can be laid down as regards periphery speed for internal grinding, but for cast-iron cylinders a soft grade wheel gives quick operation and good finish.

As to speed of work, for cylindrical jobs this is usually about 100 ft. per minute, but should depend on the action of the wheel, a point often forgotten by the operator. For surfacing by machines of the Pratt & Whitney type the most useful speed seems to be 8 to 9 ft. per minute.

Speeds of Wheels and Work

A few miscellaneous records of speeds, etc., may be mentioned. A carborundum wheel 12 x 1 x 5 in., medium grade, is used to finish ball race rings about 5 in. in diameter by $1\frac{1}{2}$-in. face, the rings being fixed on a sleeve and ten or twelve ground at one operation.

For surface grinding an aloxite cup wheel 22 x 4 in., of fairly coarse grit and soft grade in silicate bond, on crosshead locomotive guide bars in a Pratt & Whitney machine, has ground the flat surface in 10 min., the wheel running at 4,000 ft. per minute and the work at 9 ft. per minute. Small iron castings have been surfaced with a carborundum cylinder 24 in. in diameter by 2-in. face on a horizontal spindle. The work is bolted on a slotted table in front of the cylinder, traversed across the wall and back again, a mirror being placed so that the operator can see the work face. The wheel is run dry and the finish is about the same as from a smooth file. The work is done in 7 min. as against $1\frac{1}{4}$ hr. on a planer. Aluminum pistons have been ground with wheels 12 x $1\frac{1}{2}$ x 5 in., fairly coarse grit, soft grade, a solution of one part soluble oil and five parts water insuring cool cutting and a good finish.

Again, for grinding tool steel and mild steel bars to size from the black, the bars being 30 ft. long and the diameter ranging from $\frac{1}{4}$ to $1\frac{1}{4}$ in., cuts up to 0.003 in. to 0.004 in. are taken when roughing, with an aloxite wheel 24 x $2\frac{1}{2}$ in., leaving a total of about 0.002 in. to be taken off by very fine cuts to get the mirror finish desired. The same wheel is used for both roughing and finishing.

> **ARTIFICIAL ABRASIVES** have displaced natural quarried grit stones for grinding castings previous to buffing or polishing.
>
> The natural stone is worn away in eight or nine weeks, while the artificial abrasive wheel has in constant use outlasted seven such wheels.
>
> Twelve hours is taken to replace an old grit stone, whereas a new artificial wheel can be mounted in less than one hour.

Artificial abrasives have displaced natural quarried grit stones for grinding castings previous to buffing or polishing. The artificial wheel may be 40 in. in diameter by 14 in. thick, as against 90 in. in diameter by 14 in. thick in the natural stone. The work is of course done more rapidly and has a better finish. In addition the worker has the advantage that dust is eliminated, this applying also to the dust arising from the racing (truing by turning) of the natural stones. The latter, weighing 3 tons or more, is worn away in about eight or nine weeks, while a carborundum wheel has in constant use outlasted seven such wheels. As to time for dismantling, 12 hr. is taken to remove an old grit stone, clear away the mud and mount a new stone, whereas a new artificial wheel can be mounted in less than one hour. The speed employed is about 5,000 ft. per minute. In particular, artificial segments are now being employed in several cases in place of natural stone segments for surfacing cast-iron work for textile machinery.

Other Grinding Operations

An instance may perhaps be given of the grinding displacing the milling machine. Using a Churchill vertical machine a carborundum wheel 14 x 4 x $10\frac{3}{4}$ in. with $1\frac{1}{4}$-in. side walls and $\frac{5}{8}$-in. back wall, in coarse grit and soft grade, ground some 2,594 articles, the work being done in about one-fifth of the time previously taken for milling and the average cost working out at $\frac{1}{2}$d. instead of 1s. 6d.

Getting away from engineering, the use of artificial abrasive wheels may be noted in the case of paper mills for rolls of steel, brass, chilled iron, rubber and paper, shellac bond wheels being employed. Much glass work is being done with these wheels; besides being cooler and faster in cutting, they are more uniform than the natural sand stones. A slow speed, namely, 2,000 to 2,600 ft. per minute is employed, and for lens grinding very fine grit, medium grade aloxite wheels are used.

For both roughing and finishing plate glass edging the wheels are grooved on the face to suit the glass thickness, the work being fed over the top of the wheel. For dressing such fine grit wheels carborundum bricks in No. 80 grit with a special soft bond are used. Carborundum wheels of coarse grits and medium grades have been employed on molding work in marble, the wheels speed being 4,500 to 5,000 surface feet per minute, while the work speed varies according to the thickness of the marble and depth of cut. For cutting off glass tubes and ends of electric lamps wheels of very fine grits and hard grades have been claimed to be superior to the diamond. The wheels are about ⅜ in. or ½ in. thick, V-edge, and running at say 6,000 ft. per minute. The wheel cuts much the same as a diamond, the work being revolved on its face, the action producing sufficient heat to crack the glass cleanly.

Experiments with Sherardizing

By Leon McCulloch

When clean iron and metallic zinc dust, protected from the air, are heated below the melting point of zinc, the iron takes on a coating that has excellent protective value. This coating is a brittle alloy of zinc and iron, and the process is called *sherardizing*. Although the zinc particles are covered with oxide and cannot touch the iron, an extremely small amount of the zinc vaporizes and the vapor, reaching the iron, alloys with it. Other zinc then vaporizes to replace that which has been removed from the atmosphere. This process continues indefinitely at a decreasing rate, for the coating already formed permits zinc to diffuse through it to combine with the iron beneath. In this way, the coating grows outward from the surface of the iron, as the bark grows from a tree.

Observing Method of Growth

The method of growth was clearly seen while sherardizing small cubes of cast iron, at about 450 deg. C., in a small glass-stoppered bottle enclosed in a rotating drum. The dust contained about 3 per cent iron, which prevented caking, and coatings ½ in. thick were grown in a few hours. After a heavy layer had been formed, the cubes were again treated, for a shorter time. The layer last formed was seen to lie next to the iron, instead of at the outer surface, showing that the growth was from the surface of the iron outward. The coatings split at the edges and corners, leaving the iron exposed there. Flakes of graphite from the iron were lifted upward and embedded in the coatings.

The composition of sherardized coatings varies from the outer surface inward, as would be expected from the mode of growth. That is, the iron content increases slowly at first, then more rapidly as the iron is approached. At the surface the least amount of iron possible is 6 per cent, as the experiments described below have shown.

A study was made of the effect of iron in zinc dust on the process and on the resulting coatings. Glass bulbs, holding the small pieces to be sherardized, together with enough zinc dust to make them two-thirds full, were heated in a small, rotating electrically heated and controlled furnace. The bulbs had 6-in. necks, of ⅜-in. tubing, plugged with asbestos and zinc dust to absorb oxygen that otherwise would diffuse inwardly and oxidize the contents of the bulbs.

The dusts contained iron in amounts varying from 0 to 26 per cent. They were prepared by mixing 200-mesh zinc in the desired proportions with powdered electrolytic iron of the same fineness. These mixtures, before using, were heated until the iron particles had been thoroughly alloyed. The dusts containing less than 20 per cent iron were no longer magnetic, so that magnetic separation of the iron was impossible. Only oxidized particles or free iron could then be taken out.

The results showed that no part of a sherardized coating can contain less than 6 per cent iron, as heating even for 45 days fails to lower the amount. When the dust contains less than 6 per cent iron, the resulting alloy contains 6 per cent. As the iron is increased from 6 to about 10 per cent the composition of the alloy changes proportionately. When the iron in the dust exceeds 10 per cent the composition of the alloy changes rapidly to about 20 per cent. And when 20 per cent iron in the dust is exceeded, the iron in the alloy rises abruptly to a high value.

These results are in general accord with the well-known equilibrium diagram for the zinc-iron alloys. There is this material difference: These results show iron to be insoluble in zinc at temperatures below the melting point, while the diagram indicates a solid solution containing about 1 per cent iron.

Iron Content Required

The iron content in a dust should be low, but there is some question as to what the limits should be. "Dross" dust containing iron is cheap and the percentage of iron increases with use, as zinc is removed while the iron remains. Iron in dust is useful as it raises the melting point and prevents fusing or caking when a high temperature is used to give rapid deposition. Iron, however, rapidly lowers the rate of deposition, making it necessary to employ higher temperatures, indicating that the iron content should not exceed 7 per cent.

Life tests show that there is a minimum weight of zinc per square inch necessary for good coatings; to test the value of sherardizing, the weight of zinc should therefore be determined. A new method depends on the fact that a boiling 10 per cent solution of ammonium chloride removes zinc from sherardized coatings rapidly, but does not dissolve iron until the zinc is practically gone. This test may be applied in two ways: The coating is completely removed and its amount determined by loss in weight; or the weight of the coating is found approximately by noting the time for iron to appear in the boiling solution. At each 5-minute interval a drop of the solution is removed upon a spot-plate and tested with potassium ferricyanide for the presence of iron. When the blue color appears, the coating is gone, and the time is a measure of the weight of zinc. A good coating should withstand this test for 10 or 15 minutes.

A comparison of short-time rusting tests, such as the salt spray, with tests in actual service, shows that rusting in the short-time tests does not necessarily mean a short life in service. The rapid rusting tests are, however, of value in judging the quality of a coating, when an actual determination of the weight of zinc is made at the same time. These two methods of testing should supplement each other.

Extract from a paper presented at the February meeting of the American Institute of Mining and Metallurgical Engineers, in New York.

Ideas From Practical Men

Devoted to the exchange of information on useful methods. Its scope includes all divisions of the machine building industry, from drafting room to shipping platform. The articles are made up from letters submitted from all over the world. Descriptions of methods or devices that have proved their value are carefully considered and those published are paid for.

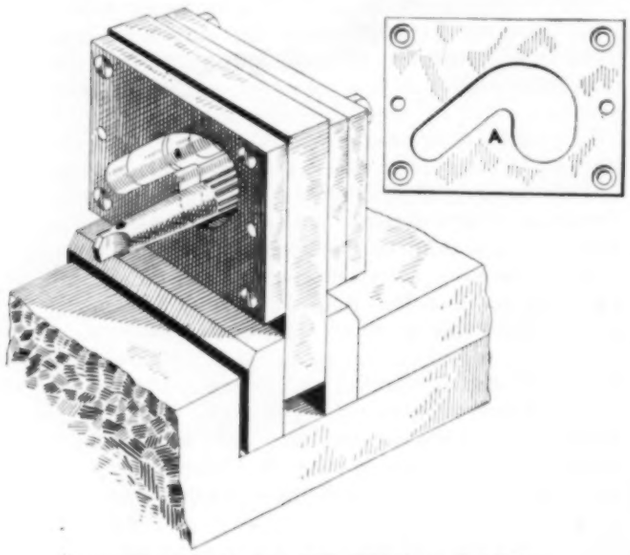
Making Cams from a Sample

BY JOHN T. CLARK

We recently were called upon to make a number of cam plates like the one shown at *A* in the sketch, a sample of which was sent in to be used as a guide, or pattern, to be duplicated. This sample was of machinery steel, pack hardened. First, machinery steel bars of the correct width were planed to the required thickness of $\frac{3}{8}$ in. and cut off in lengths suitable for the new cams. The hardened sample was then clamped to each piece in turn and the screw- and dowel-holes drilled, using the sample as a templet.

With one of the pieces still clamped to the sample, a line was scribed around the contour and the piece laid out to drill out the center; calculating to leave about 0.015 in. of metal all round for finishing. Before actually taking out the center, however, the drilled piece was used as a templet from which to drill all the others.

To mill the cams to the required contour after taking out the centers, we made a cast-iron plate of suitable thickness, as shown in the sketch, with an opening of the same shape as the contour of the sample but a little larger, to provide clearance. This plate was drilled from the sample for the screw- and dowel-holes. Dowels were set in the sample, long



CUTTING CAM PLATES FROM A SAMPLE

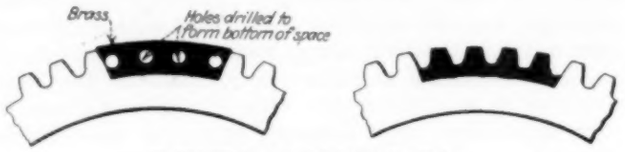
enough to reach through the cast-iron plate and extend about $\frac{3}{4}$ in. on the other side. The sample was then screwed to the plate and the whole set up edgewise in the vise of a hand milling machine.

Two special cutters were made, one with a raised shoulder about 0.020 in. larger in diameter than the cutting portion; the other parallel. Two blanks at a time would be set upon the protruding dowels and clamped to the plate. The cutter with the raised shoulder would then be used to rough out the contour, the operator following around by means of the hand levers, keeping the smooth shoulder in contact with the contour of the sample. This would leave the new piece of the same shape but with 0.010 in. of metal still to remove. It would then be finished to size with the parallel cutter, and the job completed in good time.

Method of Setting Teeth in Broken Gears

BY F. C. SINBACK

I am located in a place where gear cutting machinery is at a premium and having occasion to make repairs upon small cast-iron and steel gears, I have devised the



REPAIRING A BROKEN GEAR

following method of putting teeth in gears of 6-diametral pitch and smaller.

The damaged portion should first be prepared by heating to a dull red for the purpose of burning out all oil and grease that would otherwise tend to prevent the brass, which I use as a filler, from sticking to the seat formed in the gear.

Next, cut out the damaged portion to a point a little below the root of the teeth, as I have shown in my sketch, and clamp a carbon block to each side of the gear to act as sides to the "mold." The acetylene torch is now brought into play and the whole section properly heated so that the brass will flow quickly to all parts of the surface. Sprinkle a little flux over the surface and apply the brass rod, filling the space to a point above the circle of the outside diameter. When cool, the brass can be dressed off with a file to the proper diameter and width.

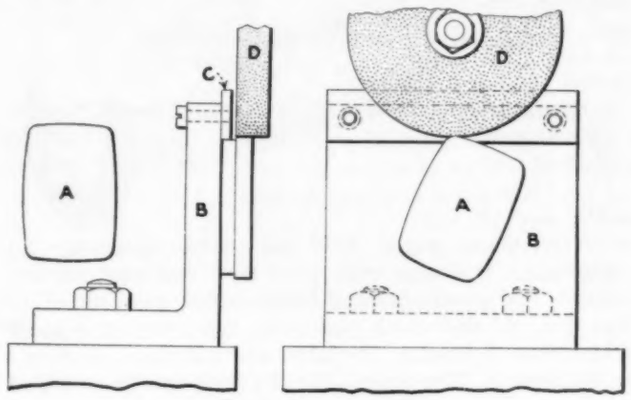
Next, cut a templet from a piece of stiff fiber paper to match the teeth of an undamaged section of the gear a little longer than the repair, and with it lay off the teeth on the finished surface of the brass. A twist drill of suitable size may be used to drill through the brass at the bottom of each space, and two hacksaw cuts from the outer circle to each hole will serve to remove most of the surplus metal, leaving enough to finish each tooth to line with a file.

This method is capable of yielding a very neat and permanent repair, much superior to the commoner method of driving in pegs and filing them to shape, and takes little if any more time. I have applied the same method to cast-iron gears of 4-diametral pitch, using cast iron as a filler, and have secured very gratifying results.

Grinding a Templet

BY T. C. JOHNS

Recently I was called upon to make a die, shaped similar to sketch *A*, a templet being provided. The specifications called for the die to be 0.015 in. larger



HOW THE TEMPLET WAS GROUND

all round than the templet, necessitating the making of a new templet.

To make the templet I took the old one and sweated a piece of ⅛-in. sheet stock to it and roughly filed this stock to shape, leaving approximately 0.025 in. all round the templet. I then ground it to size on the surface-grinding machine in the following manner:

A thin parallel *C* was clamped to angle iron *B*, held on the grinding machine table. The original templet was placed against the angle iron with the edge in contact with the parallel *C* and the grinding wheel *D* brought down until it touched the part to be ground.

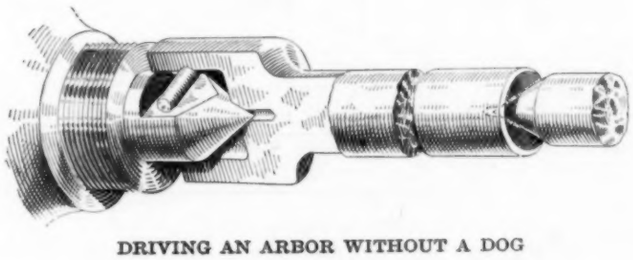
By rotating the templet and adjusting the height of the wheel it was brought to size all round.

Driving a Small Arbor Without a Dog

BY W. BURR BENNETT

Every mechanic is familiar enough with the delay and trouble caused by the necessity for changing dogs frequently when using small arbors in the lathe, and also knows the danger of getting his clothing caught by the projecting setscrew. The sketch herewith shows an arbor that we have used in our shop to advantage in taking light finishing cuts, trimming stampings, etc. It eliminates all of the trouble occasioned by the dog, and for work not heavy enough to wring the center loose from the spindle it serves the purpose admirably.

Little description is needed to explain the sketch. As many arbors as may be desired are made with one end enlarged and cupped out. A drill-rod pin driven through the recess engages the flat on the live center.



DRIVING AN ARBOR WITHOUT A DOG

Truing Work in a Chuck

BY JOHN J. HILL

It seems to be the general practice among the "boys" in our shop when truing up work in the lathe chuck, to just "put 'er in high" and hold a piece of chalk up to the work to mark the high side.

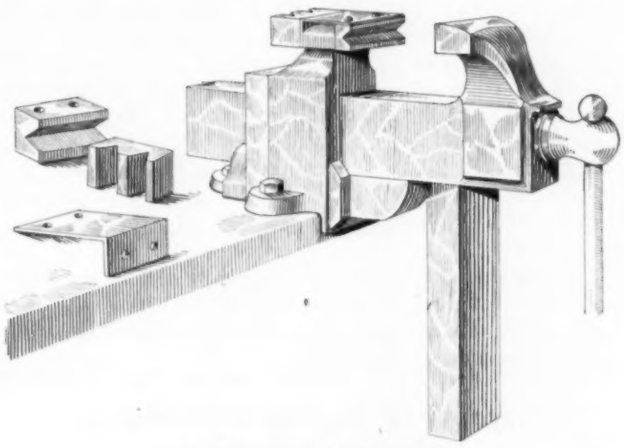
My method is to put a tool or other piece of steel in the toolpost and with each pair of chuck-jaws standing horizontal in turn, I first run the tool against the work and note the reading of the micrometer dial on the crossfeed screw. I then draw the tool back out of the way, turn the lathe spindle a half revolution and again run the tool forward until it touches the work. Noting the difference between this reading and the first, I not only know in which direction the work is "out," but I know just how much to move it to bring it to center. I claim that I can by this means true a piece of work, having a smooth surface, more quickly and accurately than can be done by the chalk method.

[Our correspondent asks us not to laugh because of the simplicity of this method. We won't—but if the piece has a smooth surface why not use an indicator?—EDITOR.]

Handy False Jaws for a Vise

BY CHARLES H. WILLEY

When holding round pieces in the bench vise a set of V-blocks secured to a piece of sheet iron, as shown in



FALSE JAWS FOR A VISE

the sketch, will be found very useful and hard to do without.

A Corliss Engine Repair

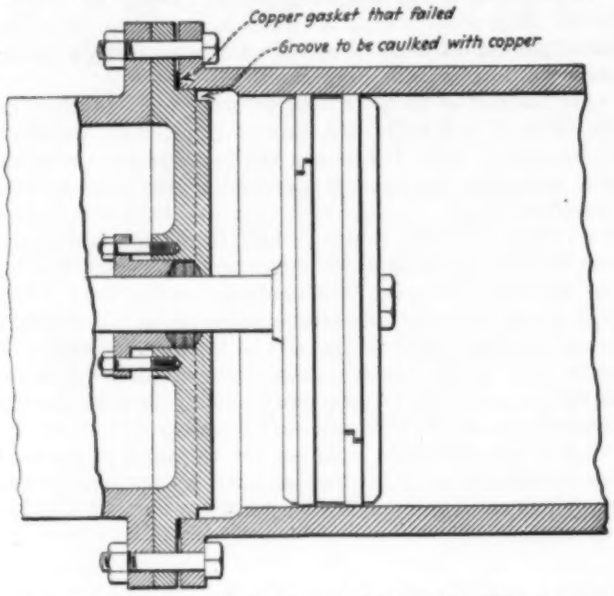
BY F. S. CARROLL

A large single-cylinder Corliss engine under my charge developed trouble by blowing out a copper gasket between the forward end of the cylinder and the end of the girder frame, which constitutes the cylinder head at that end.

To open this joint would necessitate the almost complete disassembling of the engine, because the foot of the cylinder casting would have to be lifted over the foundation bolts, and would also involve taking down the steam and exhaust connections.

We had been having other trouble with this engine because of rapid and uneven wear of the cylinder wall,

and our schedule of repairs included reboring the cylinder and making a new piston; so I decided to make the attempt to calk the leaky joint at the same time



CALKING FRONT CYLINDER HEAD OF CORLISS ENGINE

that the reboring was done and thus shorten, as much as possible, the time the engine would be out of service.

To provide a place for the calking material, an angle tool with a lip like a parting tool was set in the bar after the boring had been completed. It was adjusted outward until the side of the cutting lip just touched the wall of the counterbore. The bar was then fed forward, cutting a groove as shown in the sketch, straight into the cylinder head for a distance of about $\frac{5}{8}$ inch.

A ring of No. 2 annealed copper wire was then set into the groove and calked in as tightly as possible with a suitable tool, followed by a second ring of the same material treated in a similar manner.

Though this engine has been running five or six years since this repair was made, during which time it has again been rebored and the cylinder bushed, there has been no leakage at the joint.

Improvised Method of Grinding a Rectangular Frame

BY IRA ROFF

Having a rectangular frame, the interior dimensions of which were $4\frac{5}{8}$ x $4\frac{3}{4}$ x $1\frac{1}{2}$ in., to be ground with all sides square, the writer adopted the method here described for doing the work. The corners of the frame were rounded to a radius of 0.150 in. and it was not essential that the inner faces of the frame should be parallel with the outer ones.

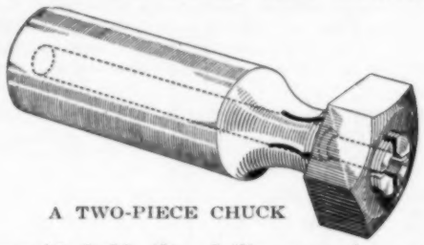
I set up the frame against an angle plate on the table of the milling machine and fastened a "Dumore" tool-post grinder in the spindle of the machine by means of an attachment provided for that purpose. Making sure that the spindle was rigidly fastened and using a wheel of the required diameter I was able to grind all four of the faces at an exact right-angle at one set-up by using the traverse and vertical movements.

There was about 0.003 in. of material to be removed and, because of the high speed of the grinder, the wheel wear was negligible.

A Two-Piece Chuck

BY E. A. THANTON

The description of a collet chuck on page 32 of the AMERICAN MACHINIST, reminded me of a very simple chuck we used to make for holding drills in screw machine turrets. The chuck, as shown in the accompanying sketch, consisted of only two parts, and if properly made would hold the drills securely and accurately. Ordinary cold-rolled steel was used for the body *A*, and a semi-finished hexagon nut was used at *B*. The body of the chuck was made from over-size stock which was chucked in the lathe and machined as shown in the sketch. The hole *C*, for the drill, was then drilled and bored to size. Pipe threads were cut on the tapered end and a nut, tapped out with a pipe tap, was fitted to it. The body was then cut off from the bar and the drill hole enlarged from the back for clearance, as shown at *D*. The tapered end was slit crosswise with a hacksaw. After casehardening with cyanide the chuck was ready for use. Made in this way, a complete chuck could be produced in far less time than could a split collet for a more elaborate chuck, and it answered all ordinary manufacturing purposes on screw machine work.

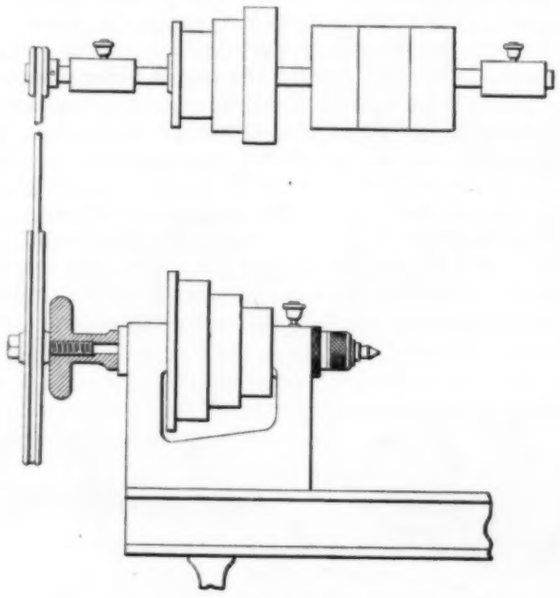


A TWO-PIECE CHUCK

Reducing the Speed of a Bench Lathe

BY DEXTER W. ALLIS

Having jobs to do frequently which could not be handled by the bench-lathe on account of its high speed, we devised a speed-reducing rig which greatly increased the range and usefulness of this tool. On the countershaft of the lathe was placed a $2\frac{1}{2}$-in. grooved pulley. This was belted to a 12-in. pulley attached to the lathe by means of a threaded stud screwing into the end of the



REDUCING THE SPEED OF A BENCH LATHE

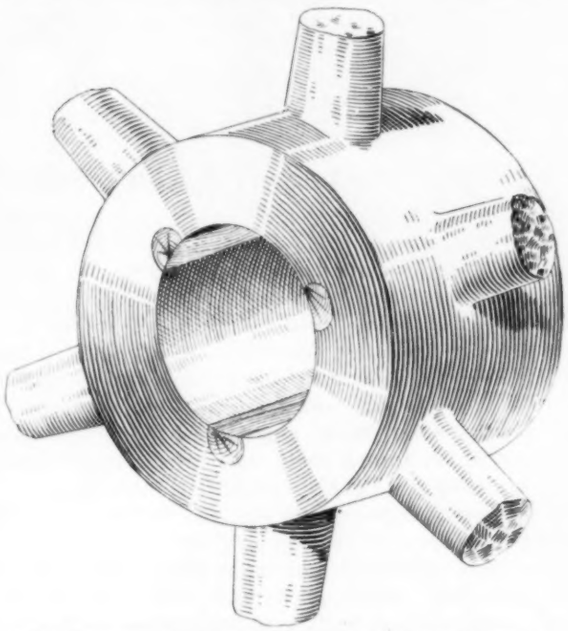
draw-in tube which was tapped to receive it, as shown. The draw-in tube was held from turning in the lathe spindle by its draw upon a center or collet blank in the nose of the spindle. With this attachment plenty of power at low speed could be obtained. The large wheel was removed when not in use.

Lubricating Loose Pulleys

BY W. D. LASALL

Having considerable trouble in keeping loose pulleys lubricated, I tried using a loose bushing having a series of holes drilled in it as recommended in an article I read in AMERICAN MACHINIST. I filled the holes with a mixture of graphite and cylinder oil. This was two years ago and the pulley has not been oiled since.

The other day I saw a pulley that had three holes drilled lengthwise through the hub, so that they broke through into the bore. See sketch. Soft pine plugs,



PULLEY HUB WITH SOFT PINE PLUGS INSERTED

soaked in oil, were driven into the holes and I was told that the pulley had been running eleven years and had given no trouble.

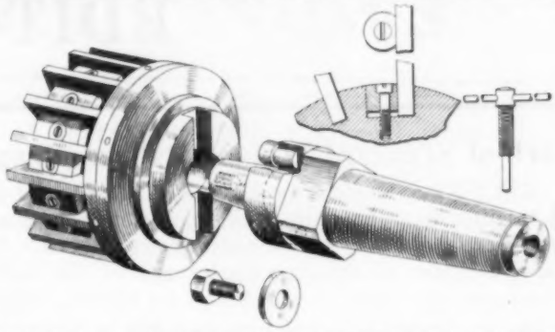
Adjustable Blade Milling Cutter and Shank

BY FRED S. HARGER

The sketch illustrates the construction of a shank for use in connection with facing or end mills on the Becker vertical milling machine and also one of the inserted blade cutters, both of which were designed by the writer. The shank, as well as the body of the cutter, may be made of machinery steel and pack hardened, or, if preferred, both may be made of tool steel.

The tapered hole in the body of the cutter should be nicely fitted to the lower portion of the shank so that it bears firmly upon the taper at the same time that it seats against the shoulder. Slots in the body of the cutter fit over the tool steel pins that are driven into the shoulder and thus insure a positive drive.

The cutter is further secured against the possibility of working loose by a capscrew tapped into the end of the shank and provided with a washer to fit into the recess at the end of the cutter body. The large end of the shank is drilled and tapped to receive the draw



ADJUSTABLE INSERTED BLADE MILLING CUTTER AND SHANK

bolt by which it is held in the spindle of the machine

The upper part of the shoulder is squared to fit the yoke of the machine spindle and thus prevent the shank from wringing loose. It also furnishes a place by which to grip the assembled tool in a vise when adjusting or changing the blades.

The construction of the cutter is evident from the sketch. The blades are of high-speed steel and are a tight fit in the slots in the body, being further secured by the flat-sided bushings and fillister head screws.

The holes in the bushings are, of course, made to the body size of the screws, the latter extending through them and entering tapped holes in the body of the cutter. The bushings are also threaded internally to fit the extractor.

In case it becoms necessary to remove the bushings, the screws are withdrawn and the extractor screwed in their places successively. The pilot portion of the extractor reaches the bottom of the threaded hole and further turning lifts the bushing out.

The bottoms of the slots for the blades are inclined so that the diameter of the cutter may be expanded by turning forward the knurled adjusting rings when it is necessary to regrind, thus maintaining the original size.

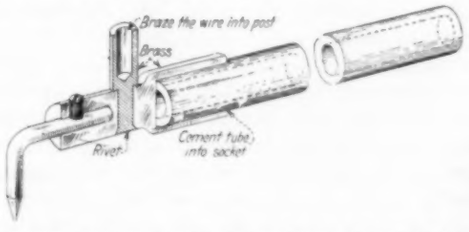
Water Gage Glass Makes Excellent Handle for Etchograph Stylus

BY R. GRANT

The wood handle to which is attached the copper stylus used for marking with the electric etchograph, has a distressing habit of getting itself burned off quite frequently. This trouble is easily avoided by the use of glass instead of wood for a handle.

A piece of heavy glass tube (an old water gage glass from a steam boiler answers very nicely) cemented into the pocket of the stylus will with ordinary care outlast any number of wood handles.

The sketch requires no explanation.



GLASS HANDLE FOR ETCHOGRAPH STYLUS

EDITORIALS

Lack of Standard Tools in Railway Shops

A RECENT investigation by makers of formed tire turning tools brought to light a sad lack of uniformity in the sizes and shapes of tools used. The sizes and shapes of the tire flanges and of the rest of the contour, are fixed by the American Railway Master Mechanics' Association and are standard on practically every railroad. The lack of uniformity in the sizes of the forming tools themselves makes it difficult to supply commercial tools at a reasonable price.

There has been in the past too little standardization of tools and other things used in railway shops. This has not been altogether the fault of the mechanical officials, but can frequently be charged to the financial policy of denying the railway shop sufficient appropriations for tools and machines. To this policy is due the common practice of "making your own" machines and tools.

Any one who has the slightest knowledge of standardization in tools and the economy which accompanies it, can see the great waste entailed by having each shop make its own tools. It would be as sensible to make drills and reamers of standard sizes in each shop.

This is one of the many opportunities for economy in many railway shops. Some, like the Santa Fe, have standardized shop equipment to a very considerable degree and have profited greatly thereby. Much of this has been offset in many cases by constantly introducing new classes of locomotives, which entails the carrying of many more spare parts at all store depots along the line.

Economic railway operation is vital to every other industry as well as its own. Those responsible for railway management will do well to follow some of the other industries in matters pertaining to shop practice. The use of standard tools as far as possible is a step in the direction of economy.

A Pleasant Record of Legislative Obstruction

ON ANOTHER page is a brief account of the trouble encountered in the efforts to enact the Patent Office Relief Bill into law. We have printed it for two reasons. In the first place it gives some of the provisions of the new law which are of interest to all manufacturers and engineers. In the second place it gives an incidental outline of unreasoning obstruction on the part of some of the honorable members of our national legislature which is illuminating.

The bill as presented was good from every angle. It gave a certain measure of vitally needed relief, and it did not saddle the treasury with a heavy additional burden of expense. But objections came up just the same and from men who should have supported the bill. Fortunately most of the members of both houses were not impressed by the objectors and the bill passed by a big majority, but it is nevertheless instructive to examine its history and judge the obstructionists by their stand.

Beware of the System!

THERE is a warning in the last installment of Modern Production Methods, which appears in this issue, that can hardly be over-emphasized. All through the series it has cropped up at intervals and here in the conclusion it is driven home once more. It tells of the danger of expecting a system to do all your work for you. A slogan something like this might be adopted with good results—get a good system and make it work, but don't let it get you. Another thing, it is not likely that the same system will work equally well in any two plants. Each shop has an individuality and a set of problems all its own and consequently the system has to be modified to fit each particular case. Beware of the universal system; it's loaded!

How We Came to Have Machine Tools

THE buyers of machine tools have never fully appreciated their worth. They rarely seem to realize that without them we should never have attained our present industrial supremacy.

Machine tools came into being because they were needed to produce other machines. The primitive lathe and drilling machine date back many centuries, but machine tools as we know them were developed to make possible the steam engine, the loom and other machines which forced their way into industry at the beginning of the industrial revolution.

As the demand for steam engines, textile and other machinery grew, the need for better machine tools became more apparnet and many ingenious machines were developed. Many good mechanics with inventive genius designed and built new and improved machines and frequently started little shops of their own. In fact nearly all of our well-known machine-tool building plants today are the outgrowth of these small enterprises.

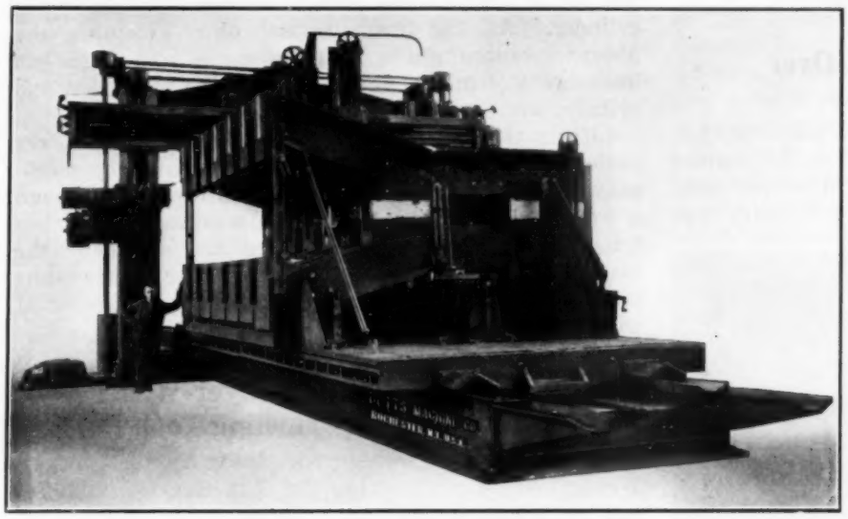
The proprietors however were frequently much better mechanics than business men. They knew little of business economics, of overhead, of selling costs, of depreciation and other important factors. In most cases they seemed to forget all about sinking funds for expansion or for dull times, and frequently priced their product so low as to leave little more than day wages to pay for the development and all that entered into it. There are, unfortunately, too many examples of this still in existence.

With few exceptions it may be said that prices of machine tools have never been set with a proper regard for the part they play in industry or the costs that go into them. Machine tool builders have been content with too small a return for their service to industry. As a result they have suffered in times of business depression from the lack of reserves of capital and have had serious trouble in weathering the inevitable business storms. It would be hard to find beter proof that the main aim of business is not to render service but to make profits while rendering service.

Shop Equipment News

Betts 15 x 10 x 38-Ft. Planer

The accompanying illustration shows a large planer recently built by the Betts Machine Co., Rochester, N. Y. The machine has a distance of 15 ft. 2 in. between the uprights and 10 ft. 2 in. between the table and the crossrail in its highest position. The table is of the box type, and has an overall length of 38 ft. and a width of 12 feet.



BETTS 15 x 10 x 38-FT. PLANER

The machine is driven by a 75-hp. reversing planer motor. A range of cutting and return speeds which can be changed instantly is provided. In addition, the table is equipped with a device providing for "air" or spot planing; that is, for automatically increasing or decreasing the speed during the cutting stroke. This device consists of a switch connected with the main controller, and is operated by sets of dogs carried on the left-hand side of the table in positions corresponding to those where increasing or decreasing of the cutting speed is desired. The return speed remains constant.

Five toolheads are provided; two heads are carried on the crossrail, one extension-slide sidehead on each upright, and one head on a separate column. The independent feed and power rapid traverse in all directions for the two crossrail heads and the two extension-slide sideheads are so arranged that each can be engaged for power rapid traverse in any direction, at the same time that the other head or heads are feeding. A 15-hp. motor located on the top of the girt furnishes power for raising and lowering the crossrail and for the power rapid traverse to the heads.

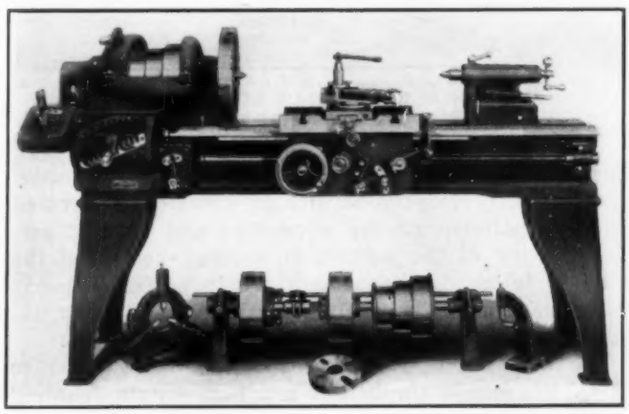
Automatic tool lifters are provided for the crossrail heads. Forced lubrication of the table ways, as well as of the driving gears, rack and shaft bearings, is furnished by means of pumps and an oil-filter system. A separate toolhead or column fastened to the bed some distance ahead of the right-hand upright carries a saddle which is provided with vertical feed and power rapid traverse in both directions. This power is furnished by a separate electric feed motor.

Carroll-Jamieson Engine Lathes

The Carroll & Jamieson Machine Tool Co., Batavia, Ohio, has recently placed on the market a line of lathes intended especially for use in toolrooms and automotive service stations. The accompanying illustration shows the 14-in. quick-change lathe, which can be supplied with either single or double back gears. A lathe of very similar type but of 16-in. size can be supplied, a cabinet leg under the headstock end being regularly furnished. In a 13-in. size, a semi-quick-change lathe with a single back gear can be supplied. The swings over the bed in the 13-, 14- and 16-in. sizes are respectively, 13¼, 15¼ and 16¼ in., while the swings over the carriage are 8, 10⅜, and 11⅜ inches.

A bowl headstock is employed and the gears are fully inclosed. The spindle is made of high-carbon steel, and has a 1¼-in. hole throughout its entire length. The spindle bearings are phosphor bronze. The tailstock is cut away so as to permit the compound rest to be swung parallel to the ways. Furthermore, it can be set over and locked in any position to permit of turning tapers.

The quick-change gear mechanism permits of cutting all standard and odd threads from 3 to 64 per inch, either right or left hand. All changes are made by the use of one handle and a knob placed in front of the headstock. Sliding gears are employed in the gear box. On the semi-quick-change lathe, three changes of feed are provided by shifting a lever. Additional changes are obtained by means of removable change gears. The apron is provided with a reversing lever for the feed, as well as with an interlocking device to prevent two feeds being engaged simultaneously. The carriage is fitted with a device for clamping it securely to the bed when facing work. It is gibbed at both the front and



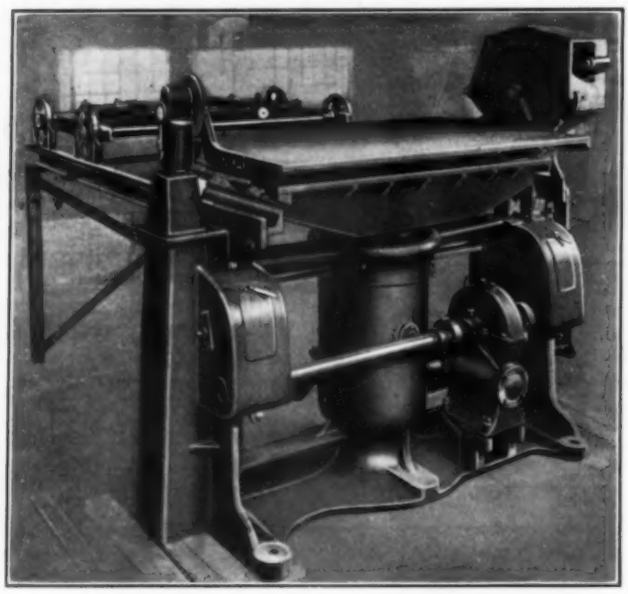
CARROLL-JAMIESON 14-INCH ENGINE LATHE

the back. Taper gibs are used on the cross-slide and the compound rest.

The lathe is ordinarily equipped with both small and large faceplates, chuck plate, steadyrest, follow rest, double-friction countershaft, as well as centers, wrenches and a thread indicator. Other attachments, such as for milling and keyway cutting, taper turning, and increasing the swing, can be furnished. The two larger sizes of machine have a distance between centers of 39 in. when a 6-ft. bed is employed. The 13-in. lathe has a weight of 1,300 lb. when a 5½-ft. bed is employed; the 14-in. lathe a weight of 1,700 lb. with a 6-ft. bed; and the 16-in. lathe 2,100 lb. with an 8-ft. bed.

Osborn Direct-Draw Roll-Over Jolt Molding Machine

The illustration shows a direct-draw, roll-over, jolt type of molding machine recently placed on the market by the Osborn Manufacturing Co., 5401 Hamilton Ave., Cleveland, Ohio. The machine is of the stationary type



OSBORN ELECTRICALLY CONTROLLED MOLDING MACHINE

and has the standard air-operated jolting mechanism. In addition, it is equipped with an electrically operated roll-over, pattern-drawing apparatus and run-out car. The drawing of the pattern is accomplished when the roll-over table and the pattern are in perfect balance. Since the drawing motion is vertical, there is no unbalancing of the parts.

The machine is built in capacities from 5,000 to 20,000 lb., and in the height and flask length required to suit the work. It is completely equipped with all necessary piping, valves and wiring. The jolting operation is performed by compressed air at a pressure of 80 lb. per square inch.

The mold is rolled over by electrically driven mechanism actuated by an automatic push button. The motion is constant and without shock. Although the entire operation is automatic, the motion may be stopped at any position by the operator. The speed at which the pattern is drawn may be easily regulated, so that the start of the draw may be made slowly, and the pattern then removed quickly after it has been loosened.

The pattern plates are bolted directly to the roll-over table, and require no blocking or other inserts either on the table or on the leveling car. The leveling car is mounted on four large roller-bearing flanged wheels and provided with a double leveling device. The latter consists of eight depressible members that can be locked by means of a hand lever, after being partly depressed by the mold as it is lowered on them. It is possible to handle two molds side by side.

The valve of the jolting mechanism is of the balanced piston type. By its use, the machine can be adjusted to give a jolting stroke from 1 to 2½ in. in length, as well as to regulate the amount of compression in the cylinder. All the bushings and pins, excepting the phosphor-bronze guide rod, jolt table and guide-pin bushings, are made of alloy steel. The jolt valve and cylinder are equipped with a force-feed oil system.

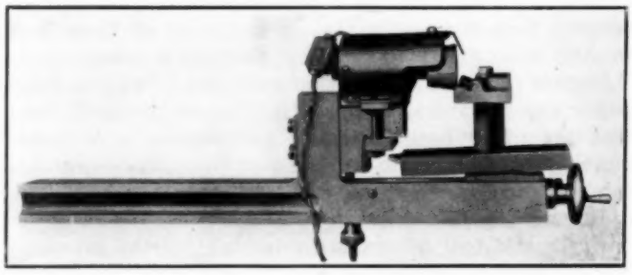
Lifting the load is accomplished by means of heavy cables coiled on drums. The motor driving the mechanism may be either a.c. or d.c., and operates through a worm drive. It is equipped with an automatic electric brake. The controllers used are either of the magnetic type with push-button control, or the manually operated upright type, depending on the character of the work.

Cutter Grinder for Sawyer-Weber Crankpin Re-Turning Tool

The crankpin re-turning tool made by the Sawyer-Weber Tool Manufacturing Co., Los Angeles, Cal., for use on lathes was described on page 840, Vol. 51, of AMERICAN MACHINIST. The tool is shown in the accompanying illustration with an electric-driven cutter-grinding attachment to enable the rapid sharpening of the toolbit. The cutter-grinding attachment can be easily applied without altering the re-turning tool in any way. It permits of sharpening the cutter in from two to five minutes.

The grinding device is driven by a ½-hp. Westinghouse electric motor running at 10,000 r.p.m. The end thrust of the motor shaft is adjusted by means of the same collet that holds the wheel. The cutter to be ground is passed in the groove of the guide blade by the fingers of the operator, and micrometer adjustments are made by the handwheel and dial of the re-turning tool. The sharpening equipment can be easily attached and the toolbit quickly ground.

The re-turning tool itself when in operation is fitted directly to one of the pins of the crank to be ground,

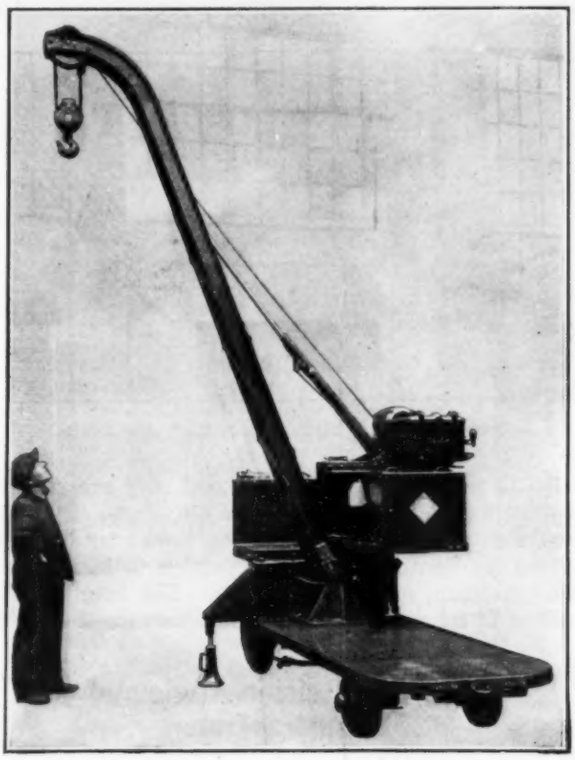


CUTTER GRINDER ON CRANKPIN RE-TURNING TOOL

and the handle or bar of the tool rests on the bed of the lathe. The handwheel serves to provide a feed for the tool, so that the size of the pin can be adjusted, and so that the amount of feed movement can be accurately measured.

Elwell-Parker Electric Crane Truck

The electric crane truck shown in the accompanying illustration is intended for heavy duty in the lifting and stacking of material in a yard or warehouse. Due



ELWELL-PARKER ELECTRIC CRANE TRUCK

to the low bed and long boom, and to the ready portability of the machine, the crane is applicable to many jobs. The truck is very similar to that illustrated on page 839, Vol. 54, of AMERICAN MACHINIST, the principal difference being the fact that a longer boom is employed and out-riggers are provided.

The out-riggers are furnished at each side, one of them being shown in use in the illustration. They are provided with jacks, so that the height may be quickly adjusted. When not in use, the jacks are lifted and turned about the pivot at the top, so that the outrigger is merely folded and then swung in close to the crane column. The illustration shows one of the outriggers in place on the ground and the other one folded and out of the way. The boom may be lowered to permit of passage through doorways.

The boom is 12 ft. in length, and may be raised and lowered by the operator without leaving the driving position. The motor and the controlling apparatus for the winch counterbalance the boom. The entire lifting mechanism can be swung about the vertical column. The crane will pick up 1,000 lb. at an 8-ft. radius at either the side or the end of the platform; with the out-riggers in position, it will lift 3,000 lb. at a 6-ft. radius.

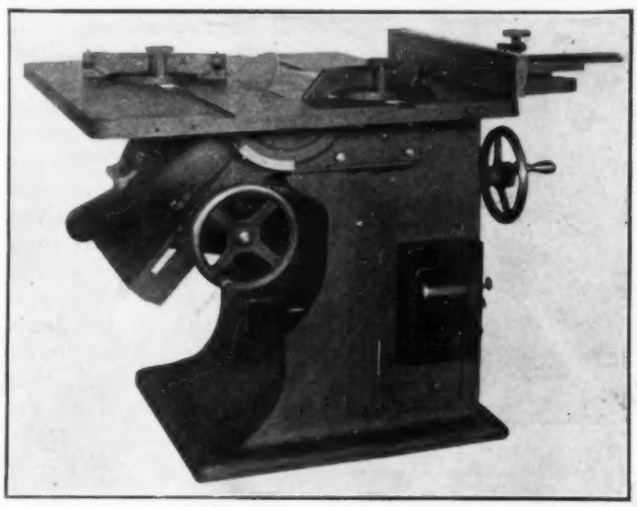
The truck is equipped with a single storage battery for furnishing power for the motors that operate the crane and propel the truck. The motors, differential worms, wheels and crane column are all fitted with ball bearings. The truck is driven by only the two larger wheels, although steering is done on all four wheels. A coupler is provided at the rear.

Tannewitz Tilting-Arbor Saw Bench

The Tannewitz Works, Grand Rapids, Mich., has recently placed on the market the Type-J tilting-arbor saw bench shown in the accompanying illustration. The saw is driven directly by a motor inclosed in the base. The motor can be supplied for either 2- or 3-phase, and for 220-, 440-, or 550-volt current. S.K.F. ball bearings are employed, with provision for oiling and draining the bearing housings.

The motor is mounted on a sliding bracket carried on a yoke hinged on the base. It is thus possible to tilt the saw by turning the handwheel on the right side of the base. Vertical adjustment of the motor is obtained by the handwheel on the front of the machine. Knobs are provided for clamping the movements after they have been adjusted.

The table is 38 x 47 in. in size. It is mounted on a base cast in one piece, so as to give a rigid construction and to exclude dust from the mechanism. The machine is provided with the necessary gages. The rip fence is non-tilting and can be used on either side of the saw. It can be adjusted by means of a gear and rack. A tilting fence can also be furnished. The saw is protected by a curved steel splitter guard. A dust spout with a



TANNEWITZ TYPE-J TILTING-ARBOR SAW BENCH

door incloses the bottom of the saw. The starting box for controlling the motor is mounted on the side of the base.

Alvord Adjustable Helical Reamer

The Alvord Reamer and Tool Co., Millersburg, Pa., has recently added to its line of "X-Cel" tools an adjustable inserted-blade helical reamer. The tool is distinguished from the concern's regular straight-blade adjustable reamer by the name "Shear-Cut," applied because of the cutting action resulting from the angularity of the blades.

The body of the reamer is made of alloy steel, and the shank is especially heat-treated to withstand rough

ALVORD ADJUSTABLE HELICAL REAMER

treatment. The blades are made of a special steel and are accurately ground all over. Both ends of a set of blades are ground so as to give proper contact with the nuts, and to insure that the blades are of exactly the same length. They are thus securely locked in their seats when the nuts are tightened. The nuts themselves are of hardened and ground crucible steel.

The reamer is especially recommended for work on bearing metals, particularly bronze. It can be used for split bearings and holes provided with oil grooves or keyways. The tool is made in seventeen sizes to cover diameters from $\frac{15}{16}$ to $4\frac{1}{16}$ in. The maker calls attention particularly to the fact that the reamer does not chatter, this effect being accomplished by giving the tool special treatment to suit it to the type of metal on which it is employed. Special equipment has been developed for manufacturing the reamers.

Krag Universal Angle Fixture

The accompanying illustration shows the "Little Bob" universal angle fixture recently placed on the market by E. L. Krag and Co., 50 West Randolph St., Chicago, Ill. The device is intended for use when making angle setups on milling, drilling and grinding machines. The plate can be tilted 90 deg. to either the front or the back. The yoke carrying the plate can be revolved throughout a complete circle. The base, as well as a flange on the horizontal pivot, are graduated so that the position of the plate may be easily adjusted. All surfaces of the plate are ground true and square with each other, so as to facilitate setting. Holes are provided in the plate for the insertion of special clamps, so that work may be easily secured to the fixture. The plate pivots on a $\frac{3}{4}$-in. stud. To lock it in position, the nut is tightened on the stud, so that friction between the large flanges prevents movement of the plate.

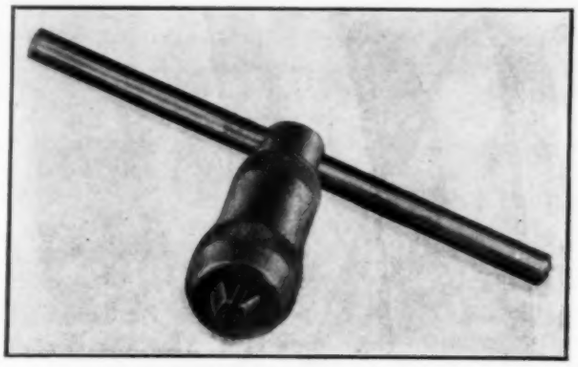
KRAG "LITTLE BOB" UNIVERSAL ANGLE FIXTURE

The yoke casting revolves on a $1\frac{1}{2}$-in. pilot in the center of the base. It can be clamped by two $\frac{1}{2}$-in. bolts fitting in circular T-slots in the base. Since the three clamping nuts are all of the same size, but one wrench is required for making all adjustments. Projecting lugs are provided, so that the fixture may be clamped to the machine table. The device is simple and rigid, and should be adaptable to a large variety of work in the toolroom. The plate is $3\frac{3}{4}$ x $4\frac{3}{4}$ in. in size; the base is $8\frac{1}{2}$ x $6\frac{1}{2}$ in. The device has a total height of $6\frac{1}{4}$ in. and weighs 25 pounds.

Consolidated Tool and Tap Holder

In the accompanying illustration is shown a device for holding taps and small tools such as reamers. It is known as the No. 90 tool and tap holder, and has recently been placed on the market by the Consolidated Tool Works, Inc., 296 Broadway, New York, N. Y. The construction gives the chuck a wide range; the maximum capacity is for taps up to $\frac{3}{8}$ in. in diameter and other tools in proportion.

The jaws are provided with V-grooves extending



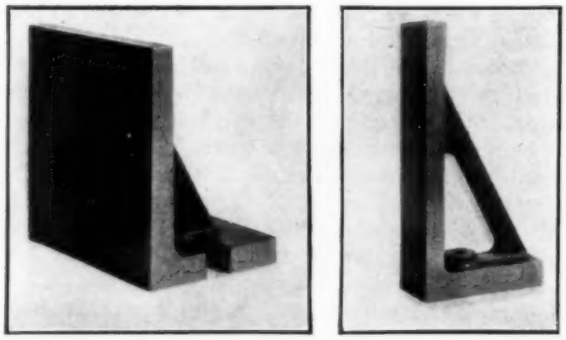
CONSOLIDATED TOOL AND TAP HOLDER

parallel to the axis of the holder, and they are serrated throughout practically their whole length, so as to give a secure grip. The opening of the jaws may be easily adjusted by turning the sleeve, which is knurled and has a maximum diameter of $1\frac{3}{8}$ in. The length of the handle is $7\frac{1}{2}$ in. and the length of the tool itself 4 inches.

Simplex Precision Angle and Measuring Irons

At the left of the accompaning illustration is shown the precision angle iron recently placed on the market by the Simplex Tool Co., Woonsocket, R. I. The device is made of cast iron and is intended for holding work in place on a machine table. Two slots are provided for clamping one leg to the table, while the slot in the other leg can be utilized to secure work to the angle iron. Two ribs brace the legs to keep the device from distorting. The iron is made in three sizes, 4 x 5 x 5 in., 6 x 6 x 8 in., and 8 x 10 x 12 inches.

At the right of the illustration is shown the precision measuring iron that has also been placed on the market. The device is especially intended for use when setting and aligning work, as for accurate boring operations. It is provided with a bolt hole and a keyway, so that it can easily be secured to the table of the machine. If desired,



SIMPLEX PRECISION ANGLE AND MEASURING IRONS

it can be used for clamping work that is to be machined. The tool is made in two sizes, $2\frac{1}{2}$ x 6 x 12 in. and 4 x 8 x 21 inches.

Hoffman Drawing Table

The Hoffman Drawing Stand Co., 189 N. Water St., Rochester, N. Y., has recently placed on the market the drawing table illustrated herewith. The board can be

HOFFMAN TUBULAR-FRAME DRAWING TABLE

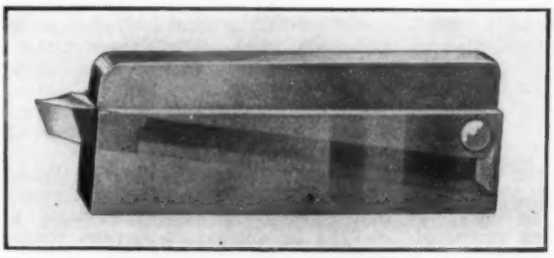
tilted about a horizontal axis to almost a vertical position toward either the back or the front of the stand. Its height above the floor can be adjusted by turning the handwheel on the vertical screw in the center of the frame. The maximum height of the board is 44 inches.

The principal feature of the frame consists in the use of tubular members. The frame is light in weight, although possessing strength and rigidity. The feet of the stand are provided with cork inserts, so as to prevent slipping and marring of the floor. A separate tray fastened to the stand can be placed on either side so as to carry the draftsman's instruments. A drawer is provided in this tray. The height and the position of the drawer tray can be adjusted to suit the convenience of the operator.

Lovejoy "Use-em-up" Toolholder

A toolholder which is intended to effect a saving by making it possible to use up short toolbits, has been placed on the market by the Lovejoy Tool Works, 319-331 West Ohio St., Chicago, Ill. The device, which is shown in the illustration, is known as the "Use-em-up" toolholder.

The holder is made of tool steel and designed to



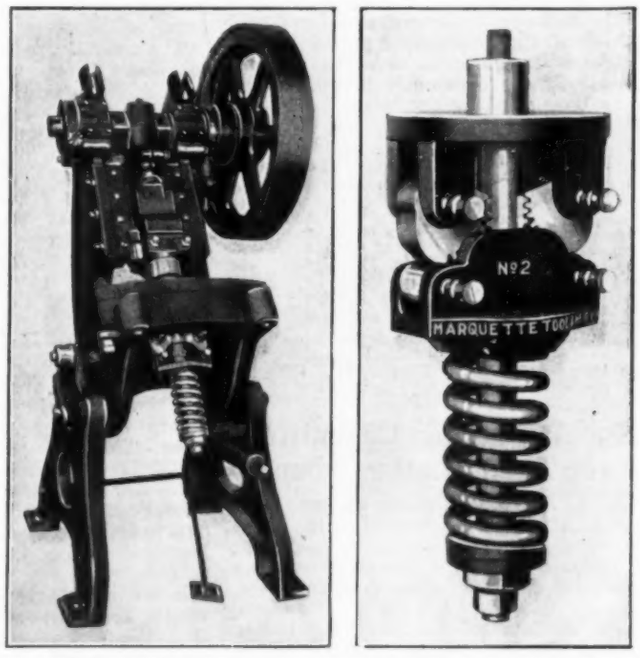
"USE-EM-UP" TOOLHOLDER

withstand heavy service. It will hold full-length toolbits without danger of breaking them, but is particularly useful when the toolbits become short through repeated grinding. Toolbits as short as $\frac{11}{16}$ in. can be rigidly held, and the holder can be used very close to the work. The No. 2 holder carries a bit $\frac{3}{8}$ in. square in section, and is $\frac{5}{8}$ x $1\frac{1}{2}$ x 4 in. in size.

Marquette "Even-Pressure" Spring Cushion for Punch Presses

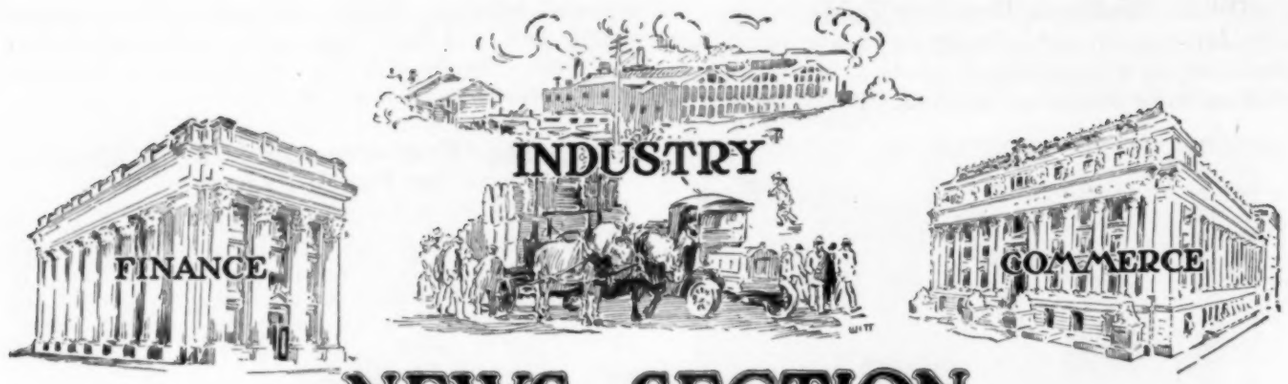
The Marquette Tool and Manufacturing Co., 321 West Ohio St., Chicago, Ill., has recently developed for use on punch presses the attachment shown both separately and in place on a press in the accompanying illustration. The device is known as the "even-pressure" spring cushion and is similar in principle to the cushion previously described on page 570, Vol. 55, of AMERICAN MACHINIST. It is claimed that, due to the uniform pressure obtained during the entire stroke of the press, deeper shells can be drawn in one operation.

A bolt is screwed under the die or bolster plate, and the cushion is slipped over it and held in place by a nut. An arrangement of compensating cams works in conjunction with the spring so that the pressure does not build up toward the bottom of the stroke. The action reduces the strain on the metal and prevents back lash on the return stroke. It is said that due to the elimination of wrinkles in the blank and excessive pressure on the draw-ring, the dies are not worn as quickly and repair costs are reduced.



MARQUETTE SPRING CUSHION FOR PUNCH PRESS

The cushion can be installed without alteration of the dies, and without drilling holes in the press or bolster plate. It can be easily adjusted for different pressures, and it retains its adjustment when either on or off the press. The attachment is especially adaptable to use on presses of small or medium size for drawing metal shells where the conditions require that the device be attached and detached quickly. Its universal application makes it possible to do a great variety of jobs with the same device, as it can be readily changed from one press to another. The cushion is made in four sizes intended for maximum depths of draw from $1\frac{1}{4}$ to 4 in. and for maximum pressures from 1,800 to 6,000 pounds.



NEWS SECTION

Comparison of January Sales With Other Years

The following table from the monthly statement of the Federal Reserve Bank of New York shows the value of sales in the month of January for the past four years. For purposes of comparison sales in January, 1921, are taken as 100 and January sales in other years are expressed in percentages of this base. A column is also added showing the approximate relative values of the products handled in the different lines. The reports of the United States census of manufactures have been used as the basis for calculating the relative values.

	Relative Values	Monthly Sales Jan., 1919	Jan., 1920	Jan., 1921	Jan., 1922
Dry goods	20	134	274	100	140
Drugs	3	106	126	100	110
Shoes	7	131	242	100	106
Diamonds	1	274	309	100	100
Jewelry	1	120	255	100	90
Groceries	37	118	158	100	91
Clothing	25	97	176	100	77
Stationery	2	89	98	100	75
Hardware	3	112	140	100	72
Machine tools	1	200	186	100	31
Weighted av.		114	181	100	9

Standardization Committee for Turret Lathe Group

A. J. Jones, chairman of the committee of the National Machine Tool Builders' Association which is in charge of standardization of turret lathes, has appointed the following men to assist him in that work: R. E. Flanders, Jones & Lamson Machine Co.; Oskar Kylin, Foster Machine Co.; Charles Meier, Acme Machine Co.

Adding Machine Companies Cleared of Charges

The Federal Trade Commission has dismissed, because of insufficient evidence, complaints charging unfair competition against the following adding machine companies: The Adder Machine Co., Wilkes-Barre, Pa.; Accounting Machine Co., Inc., New York City; Burroughs Adding Machine Co., Detroit, Mich.; The Dalton Adding Machine Co., Cincinnati, O.; Ellis Adding Typewriter Co., Newark, N. J.; International Money Machine Co., Reading, Pa.; Marchant Calculating Machine Co., Oakland, Cal.; Rockford Milling Machine Co., Rockford, Ill.; Teetor Adding Machine Co., Des Moines, Iowa.

N. F. T. C. Scheme to Aid Unemployment Here

The National Foreign Trade Council has sent a letter to trade organizations and Chambers of Commerce throughout the country requesting their co-operation in a plan which it believes will assist in reducing unemployment in the United States, by providing that a part at least of the proceeds of foreign loans floated here shall be spent for the purchase of American products.

The council urges American investors to insist that the underwriters of foreign loans shall require the inclusion in the loan agreement, wherever practicable, of a stipulation covering such use of the loan proceeds. The council points out that it is the settled practice of British and other European bankers, and adds that the effect of such a practice is providing employment for the industries of the country furnishing the money is obvious. This proposal of the National Foreign Trade Council is particularly significant in view of the importance of the firms composing the council.

"The United States today has an industrial establishment capable of providing much more than is needed to meet domestic requirements," states O. K. Davis, secretary of the council. "The slackness of foreign trade is one of the strongly influential factors in our present business depression. The Foreign Trade Council believes that this depression might be substantially relieved by requiring foreign countries which are borrowing here, to follow their loans with orders that would give work to American factories."

The letter calls attention to some recent instance where this policy was not followed, in one of which the borrowers expected to be required to spend part of the loan in the United States; but because they were not so required, they are planning to spend in Germany the money borrowed here.

Auto Industry Ahead of Iron and Steel

The value of automobiles produced in the United States in 1920 was $917,470,000. If the $450,000,000 in tires, the $184,000,000 paid for garage hire and wages, and the many millions spent on motor car accessories, are added, the automobile industry looms up with $1,500,000,000 turnover. This brings it ahead of the steel and iron industry.

President Signs Screw Thread Resolution

The President has signed House Joint Resolution 227, thereby extending the term of the National Screw Thread Commission for a period of five years from March 21. The commission was scheduled to meet on March 17 to formulate plans for the extended work which it now will undertake.

Some opposition has been voiced recently to the effect that too many are dabbling in standardization. It was reported that some opposition would meet the Screw Thread Commission bill in the Senate on that ground, but it failed to materialize. Senator King, of Utah, did ask if Congress is not making appropriations for similar work which could be discharged just as well by this commission, which receives no salary. He apparently was satisfied by the assurances given him by Senator McNary, of the Committee on Manufactures, and he interposed no objection. The bill passed by unanimous consent.

National Metal Trades Association to Convene at New York

The twenty-fourth annual convention of the National Metal Trades Association will be held at the Hotel Astor, New York City, on Wednesday and Thursday, April 19 and 20.

On Monday preceding the convention the executive committee will convene, and the twenty-three branch secretaries will hold their semi-annual meeting. In the evening there will be a joint dinner of the administrative council with the local branch presidents and secretaries. On Tuesday, the administrative council will hold its semi-annual meeting.

On the evening of April 18, the annual dinner of the Alumni Association will be held.

The convention will open on Wednesday morning with a short business meeting. Able speakers have been secured to discuss important business, financial and labor questions of the day.

The association, after a most careful survey of apprenticeship training, covering a period of more than two years, has prepared a very exhaustive plan of apprenticeship training, which will be submitted to the members at the convention.

Ordnance Department Gets Large Share of Army Appropriations

While heavy reductions were made in appropriations asked for the Ordnance Department of the Army, that service has fared better at the hands of the Appropriations Committee of the House than have many other bureaus. In the War Department appropriation bill just reported to the House, the following amounts were allowed on items involving machine shop activities: Ordnance stores and supplies, $150,000; manufacturing and repairing arms at national armories, $400,000; automatic rifles, $250,000; tanks, $300,000; field artillery armament, $750,000; alteration and maintenance of the mobile artillery, including the purchase and manufacture of machinery, tools and materials, necessary for the work and the expenses of the mechanics engaged thereon, $400,000; improvement of arsenals and depots, including machinery for manufacturing purposes in the arsenals, $805,000; testing machines, $26,250; coast defense cannon, $450,000; alteration and maintenance of sea-coast artillery, including the purchase and manufacture of machinery, tools and materials, $350,000; sea-coast cannon for insular possessions, $150,000; sea-coast cannon for Panama Canal, $85,000.

In justifying the appropriations asked, Gen. Peirce, assistant chief of ordnance, appeared before the committee. Among other things he explained that it is necessary to go ahead and complete the work on fourteen 16-in. guns that are so far advanced that it would cost less to complete them, than it would to adapt special mountings to such naval guns as might become surplus. He explained that it would cost $175,000 to make a Barbette carriage for the 16-in. naval gun. The naval gun cannot be used on the Army Barbette carriage because of the difference of dimensions in two ways. The Navy gun is longer from the trunions to the breach than the Army gun, and it requires a modification of the carriage to get the required angle of fire. The Navy slide is also different from the Army slide. It was brought out at the hearing that a completed 16-in. Army coast defense gun represents a cost of $550,000. Other interesting points brought out during the discussion of the ordnance appropriations follow:

There are 2,406 five-ton tractors in storage and 1,073 ten-ton tractors. In addition there were 1,250 ten-ton tractors turned over to the various states for road-building purposes. Care is taken at all ordnance manufacturing plants to keep wages adjusted to the level of wages paid by private industry in the same region. At the small-arms factory at the Springfield (Mass.) arsenal, it is planned during the next fiscal year to employ about 300 men so as to maintain a daily output of thirty rifles per day. This is regarded as a very thin skeleton organization. Before the war the minimum rate of manufacture was seventy-five rifles per day. During the war it was demonstrated that nearly any manufacturer of automobile frames could manufacture bombs.

The Coal Supply—If There's a Strike Next Month

An analysis of the coal situation, the purpose of which is to give business men information regarding possible fuel supplies in the event of a strike of miners on April 1, was issued last week by the coal bureau of the natural resources department of the Chamber of Commerce of the United States.

A general summary states that factors which will control supplies in case of a strike that closes the mines in union fields, will be stocks on hand and output of non-union fields. As the anthracite field is 100 per cent unionized, all supplies in the event of a complete closing of the mines will have to be drawn from stocks on hand. There are no figures available showing stocks in the cellars of consumers, nor in the hands of dealers. The United States Geological Survey has published figures based on statements from 648 typical retail dealers, showing the supply of anthracite usually carried by them on April 1, as follows:

April 1, 1919.....31 days
March 1, 1920.....21 days
April 1, 1921.....36 days

If these figures should hold good for all dealers, there would be in dealers' hands a month's supply on April 1.

The Geological Survey reports that stocks of bituminous coal in the hands of consumers on Jan. 1, 1922, totalled 47,000,000 tons. The Geological Survey further notes that stocks cannot fall much below 20,000,000 tons (as in 1920) without danger of a "coal panic." The quantity of coal, therefore, which can be drawn from stocks on hand before a serious situation develops is about 27,000,000 tons. To this supply there will be continually added the output of non-union fields. The strike of 1919 furnishes some precedent as to what can be expected. At that time non-union districts furnished approximately 4,000,000 tons per week. Assuming this year's consumption to be comparable to that of 1921 (7,600,000 tons per week), the supply from non-union fields would fall short 3,600,000 tons per week of meeting the demand. To cover this deficit we might have the 27,000,000 tons of stored coal, which would last approximately eight weeks. This period might be lengthened by increased production from the non-union fields and there are reasons to believe this production will increase, but how rapidly and to what extent can only be conjectured.

Army Departments Lose on Sales

The Air Service of the Army during February sold surplus property, which cost $310,382.93, for $117,336.57. The recovery was 38 per cent of the original cost. The Motor Transport Corps during that month sold surplus property which cost $417,314.63, for $29,775.10. The recovery in that case was 7 per cent of the original cost. The Ordnance Department sold surplus property during February which cost $2,126,831.39, for $274,258.45. The recovery was 13 per cent of the original cost.

Metric Bill Hearings Completed—Advocates Die Hard

Hearings on the Britton-Ladd metric system bill have been definitely closed with the final appearance of representatives of the American Metric Association to rebut the testimony given in opposition to the legislation.

Senator McNary in the final hearing asked Howard Richards, secretary of the American Metric Association, if he expected the bill to be reported out in its present form. To this Mr. Richards replied: "I certainly believe it should be, in view of all the evidence that has been brought out. We are ready to consider any modifications but unless there is some far more important objection than has been suggested so far, we are sincerely of the opinion that the bill is a good bill."

Mr. Richards submitted a brief in which he attempted to show that the objection had its chief inspiration in Henry D. Sharpe, treasurer of a company which he claims has a peculiar interest in opposing the metric system. Mr. Richards points out that there was only one attempt to submit an actual statement of costs incident to the change from the existing to the metric system of weights and measures. He cites items in this estimate which he regards as unfair. He stated that C. C. Stutz and S. S. Dale, who were the principal witnesses opposing the bill, have been paid to oppose the metric system, and declared it to be "unfair to present their unverified material in the name of others." Continuing, Mr. Richards says in his brief:

"Although Mr. Dale is not an engineer, he does not hesitate to take issue with the leading authorities. Mr. Dale's testimony is remarkable in its misuse and misrepresentation in regard to what the metric system is and how it should be used."

Theodore H. Miller, of the DeLaval Separator Co., testified before the committee in regard to an article in the Feb. 23 issue of AMERICAN MACHINIST This article gave an account of the discussion before the National Council of the Chamber of Commerce of the United States, at which meeting the point was raised that the DeLaval company may be influenced to use metric measurements because certain of its parts are made abroad to metric measurements. In that connection Mr. Miller made the following statement to the committee:

"The separator company's business was established in this country thirty-five years ago. All of the parts were made to English dimensions until ten years ago when they were changed to metric without any reference to parts made abroad. No parts are imported from Sweden except about 100 special machines per year, too small a quantity to be manufactured in this country. There also are brought in a few repair parts for very old machines originally built there. No parts have ever been imported from Germany. The total importations are a very small fraction of one per cent. All parts have been manufactured in this country for machines built in the last twenty years. I have reason to believe that other statements put forth by the opposition have as little foundation."

Some of the Men Who Are Prominently Mentioned in Connection with Big Machine Tool Merger

Proposed Merger of Machine Tool Manufacturers

The rumor has been rife for several weeks of the merger of several leading machine tool manufacturing companies. We are now able to announce that the plans for the merger have finally been completed and that an official announcement will probably be made shortly.

The new corporation, the name of which has not yet been definitely decided upon, will be not only one of the largest machine tool organizations, but one of the largest mergers of machinery manufacturing concerns that has ever been formed.

The companies included in the merger are The Lodge & Shipley Machine Tool Co., The Carlton Machine Tool Co., Newton Machine Tool Works, Inc., Betts Machine Co., The Colburn Machine Tool Co., Hilles & Jones Co., Modern Tool Co. and Dale Machinery Co.

The Companies Included

We have collected brief sketches of the histories of the companies involved to show the background of accomplishment that is behind the new merger. Here they are:

The Lodge & Shipley Machine Tool Company is the direct descendent of Lodge & Barker, which began to build machine tools in Cincinnati, at Fifth Street and the C. H. & D. railway in 1880. "Uncle Billy" Lodge, as his friends affectionately called him, had saved up $1,000 and with this as a start, they grew and prospered, so that in fifteen months they were employing seventy-five men. In 1886 Barker sold out to Charles Davis and the firm became Lodge & Davis. Six years later 1892, Mr. Lodge sold out and joined Murray Shipley in forming the present Lodge & Shipley Machine Tool Company. In 1918 the estate of William Lodge acquired the interest of Murray Shipley and the concern has since been operated under the management of J. Wallace Carrel.

The Carlton Machine Tool Company was organized in 1916 to build radial drilling machinery by William Lodge, Jack Carlton and J. Wallace Carrel. Although it will not reach its sixth birthday until May, it is a well developed, husky youngster that has made its mark in the radial drilling field.

The Newton Machine Tool Works made its bow in Philadelphia in the early 80's, Charles C. Newton being the guiding spirit. It is not generally known however, that previous to this, in 1876 to be more exact, Newton & Cox (the J. D. Cox of the Cleveland Twist Drill Co.) built planers and milling machines in Cleveland, Ohio. His successor, Harry W. Champion, has the advantage of having grown up with the firm under Mr. Newton's guidance and is thoroughly familiar with all the past history of the firm and its product.

Away back in 1861, two brothers, Edward and Alfred Betts, organized what is now the Betts Machine Company under the trade name of E & A Betts, in Wilmington, Del. While in the beginning they built a large variety of machines both large and small, they early began to specialize on larger machines and built up an enviable reputation in this line. This specialization has continued since the business was merged with that of the Bridgeford Machine Tool Company and the Ingle Machine Company, both of Rochester, N. Y. There names have been dropped, however, and the name is still the Betts Machine Company, occupying a new shop with 190,000 sq.ft. of floor space, in the outskirts of Rochester.

The Colburn Machine Tool Co. came into being in Franklin, Pa., in the 90's under the guidance of Mr. Colburn, who was formerly superintendent of the Baker Brothers Co., in Toledo, and Chas. Miller, commonly known as "General" by his many railroad friends. Since 1901 this company has been under the management of Harry W. Breckenridge, moving from Franklin in 1921 and now occupying one of the finest and most modern of machine tool shops, in Cleveland, Ohio. Details of this shop were illustrated during the past year. Beginning with the Colburn keyseater, a line of heavy-duty drilling machinery and vertical boring mills have been developed, that have won an enviable reputation.

Among the pioneers in heavy machinery for punching, bending, shearing and otherwise machining metal plates and sheets for boiler work and in shipbuilding, was the Hilles & Jones Company, of Wilmington, Del. Its machines have been well known in our shops for half a century or more, during which their growth has been steady and interesting.

The Modern Tool Company of Erie, Pa., is comparatively young in the industry, but still a product of the early 1900's. Beginning as a maker of thread cutting tools of various kind, it has expanded and extended its lines to include grinding machines of different styles and capacities. The founders were Calvin N. Payne and Joseph Seip. The sales manager is C. E. McArthur; and Dana Payne, a grandson of Calvin N., is growing up with the business.

The Men Mentioned

Short accounts of the histories and the personalities of the men said to be interested in the plans for the new corporation follow:

C. K. Lassiter is perhaps the best known buyer of machine tools in the country. This is especially true when it comes to the builders of such machine tools as are large enough to find a place in locomotive building. For he has been the presiding genius of machine shop equipment of the various plants of the American Locomotive Company for many years. Nor is that all. When he doesn't find just the kind of machine he thinks ought to be used for a certain job, he goes to work and designs one, has it built and puts it to work. It doesn't matter much whether its a stay bolt machine or a new radial drilling machine, the result is the same. He gets what he wants, even if he has to go into the machine tool building game to get it.

Waldo H. Marshall's first practical experience was in the drafting room of the old Rhode Island Locomotive Works. After considerable editorial experience both in Chicago, on the *Railway Review*, and in New York on the *American Engineer*, he became assistant superintendent of motive power of the Chicago & Northwestern Railway in 1897, going to the Lake Shore Railway in 1899 and advancing successively from superintendent of motive power, to general superintendent, and to general manager in 1903. Leaving this in 1906 he became president of the American Locomotive Company and retained this position until 1917. From here he became identified with well-known banking interests and is still connected with them. He was a member of the Naval Consulting Board and of the Committee of Industrial Preparedness in New York, making a survey of the industrial resources of the state. In 1918 he was appointed chief of the Production Division of the Ordnance Department. His more recent connections have been with the T. A. Gillespie Co. and the Gillespie Manufacturing Co., being chairman of the board of the latter.

J. Wallace Carrel is, without question, one of the best known machine tool men in the United States, not to mention Europe as well. Starting with Lodge, Davis & Co., in 1888, he had a varied career, but always with machine tools. Managing stores in New York, Cleveland and Chicago, traveling in this country and in Europe, and presiding over the destinies of the Draper Machine Tool Co., in Worcester, were all part of his training. Then, when the American Machinist wanted a man to study conditions in Euope—a man in whom the whole industry had the utmost confidence—it picked the logical man, Wallace Carrel. After this he became sales manager of the Lodge & Shipley Machine Tool Company of which he is now vice-president and general manager, as well as being treasurer of the Carlton Machine Tool Company.

J. J. Dale, began his work in civil engineering lines getting into the railroad game at an early age. His entrance into the machine tool field dates back to 1908 when he joined the sales force of the Celfor Tool Company, where he became sales manager before leaving them in 1918 to organize a company of his own. This was the Howe, Dale, Brown Company, which dealt in machine tools and supplies. This later became the Dale-Brewster Company and in 1918 Mr. Dale purchased the Brewster interests, changing the name to the Dale Machinery Company. During 1916 and 1917 Mr. Dale spent much of his time in Europe, a portion of this being devoted to consulting work of the aviation section of the A. E. F.

Harry W. Breckenridge entered the machine tool field in 1901 with the Colburn Machine Tool Company, then located in Franklin, Pa. Those who have watched the growth of this company can see the guiding hand that has finally brought the company out of its old shop in Franklin and into one of the finest machine tool plants in the world. Mr. Breckenridge is now treasurer and general manager of the Colburn Machine Tool Company, as well as having

other interests in somewhat similar lines. Avoiding methods which savor of red tape, he goes directly at the problems which present themselves. And no matter how busy he may be his human sympathy and friendly interest in others, always insures consideration and courtesy.

HARRY W. CHAMPION started with the Newton Machine Tool Works before it was even incorporated. He has worked in every branch from the office to the shop and drafting room and then back to the office as sales manager, secretary, general manager and president. While chief draftsman he pioneered the plan of having a huge blackboard on which the machines could be drawn full size—and they were large machines too.

A. H. INGLE began his business career in a bank but made his way into the machine tool game early in life, starting with the Bridgeford Company, Rochester, in the heavy lathe field. Later he bought out an old machine shop, moved it into a new building and changed its name to the Ingle Machine Company. Later, Bridgeford again claimed his attention. Here he made such a success that he bought the Betts Machine Company several years ago, built a new shop in Brighton, a suburb of Rochester, and installed the combined companies in a thoroughly modern plant under the Betts name.

ROBERT R. LASSITER is the son of C. K., and a graduate of Sheffield Scientific School, Yale. He hasn't years enough to his credit as yet to be in C. K.'s class. But with the combination of such a father and having been connected with J. J. Dale in the machinery selling game, it requires little but imagination to guess that he will be much better known in a very few years.

JACK C. CARLTON'S first name may be John, but if so nobody knows it—he is "Jack" to everyone. What more can be said of a man's personality. Starting with the Bradford Machine Tool Company he has gained his experience in many shops. These include the American Tool Works, Bickford Tool Company and Lodge & Shipley. He has been foreman, demonstrator and European representative for Lodge & Shipley, traveling for three years in fifteen countries. With others he formed the Carlton Machine Tool Co. in May, 1916, and since then Jack has been very much on the map when it comes to getting production out of radial drilling machines.

HENRY J. BAILEY has grown up with the Hilles & Jones Company and has naturally worked his way through the different departments. This includes being sales manager, general manager, and now president. His long connection in this line makes him thoroughly familiar with the types of heavy, plate working machinery for which the Hilles & Jones Company has long been noted.

We regret that lack of time has prevented us from getting accounts of the business activities of C. E. McArthur, sales manager of Modern Tool Company and Mr. Payne.

Director Klein of the Bureau of Foreign and Domestic Commerce states that four machinery associations are in process of co-operating with the bureau in trade promotion.

The Trend of Business Improvement—Plants Resuming

The Chevrolet Motor Co., Bay City, Mich., has adopted a night schedule at its plant, in addition to a full-time, full-crew working day. The extra shift will give employment to about 100 men.

The J. L. Mott Iron Works, Trenton, N. J., is increasing production at its plant. Orders on hand are more than 40 per cent in excess of those booked in the corresponding period a year ago.

The Standard Steel Car Co., Hammond, Ind., is arranging for increased operations at its local plant. Within the next sixty days, work will be placed under way on the construction of 2,600 refrigerator cars for the Pacific Fruit Express Co., a subsidiary of the Southern Pacific Railroad. The order will keep the wood car department running full for at least 150 days. It is expected that the plant will be operating at 100 per cent in all departments by the spring, employing the usual quota of 2,500 men.

The United Shoe Machinery Co. is increasing the working force at its plant at Beverly, Mass.

The Bethlehem Steel Co., Bethlehem, Pa., has resumed operations at its local rail mill after a number of weeks curtailment.

The Bethlehem Shipbuilding Corporation, a subsidiary of the Bethlehem Steel Co., is increasing operations at its Harlan & Hollingsworth plant, Wilmington, Del., devoted to the manufacture of railroad cars, giving employment to about 500 additional men. The plant has orders for 85 steel cars from the Philadelphia & Reading Railroad Co.; 10 steel cars each for the Central Railroad of New Jersey and the Huntingdon & Broadtop Railroad Co., Huntingdon, Pa.

The Ford Motor Car Co., Detroit, Mich., has adopted an increased operating schedule at its Canadian plant, with a five-day week, each day 8½ hours. The output now totals 218 cars a day.

The Hudson Motor Car Co., Detroit, Mich., is increasing manufacture both of Hudson and Essex cars. The month of February was one of largest in output since July, 1920, totaling 3,500 completed automobiles of the two types. Present shipments are said to be from 200 to 250 cars a day.

The Standard Steel and Bearings Co., Plainville, Conn., has resumed production at its local plant, following a shut down of several months. The company has removed all of the machinery from its New Haven plant to the Plainville works, and in the future will concentrate operations at this point.

The White Motor Co., Cleveland, Ohio, manufacturer of motor trucks, is advancing production at its plant. Orders received during February were the largest of any month since June, 1920.

The Santa Fe Railroad Co. has resumed operations at its shops at Cleburne, Tex., giving employment to about 1,000 men.

The Staten Island Shipbuilding Co., Richmond, S. I., is adding to its working force due to increased work on the reconditioning of two liners.

The Alan Wood Iron and Steel Co. has resumed full operations at its Schuylkill Iron Works plant, Conshohocken, Pa. This is the first time that the plant has been on this basis in a year.

The American Bushings Co., Marysville, Mich., manufacturer of bushings for automobile engines, has advanced its output 100 per cent, effective March 1, making a production schedule of 3,000,000 bushings per month.

The Pittsburgh & Lake Erie Railroad Co. has resumed operations at its repair shops at Dickerson Run, near Frostburg, Md., following a shut down of more than a year.

The Bettendorf Car Co., Bettendorf, Ia., has secured an order for cars totaling $1,500,000 from the Union Pacific and Southern Pacific railroads.

The American Locomotive Co., New York, N. Y., has received an order for ten locomotives from the Florida East Coast Railroad Co.

The Mason Motor Truck Co., Flint, Mich., is planning for early operations at the local plant of the Young Spring Co., which it recently acquired. The plant approximates 35,000 sq.ft. of floor area and will be equipped to provide for a maximum daily capacity of thirty complete motor trucks, known as the Mason Road King. The Mason company was organized last year with a capital of $500,000. It is headed by A. C. Mason, formerly connected with the Cadillac Motor Car Co. and the Buick Motor Car Co. of the General Motors Corporation.

The Union Pacific Railroad Co., has placed an order with the Inland Steel Co., Chicago, Ill., for 350 tons of spikes; and with the Kansas City Bolt and Nut Co., Kansas City, Mo., for 200 tons of track bolts.

The Rickenbacker Automobile Co., Detroit, Mich., will increase production at its plant at once. The schedule of 6,500 cars, as recently arranged, has been advanced to 12,000 cars for the present year.

The Greenfield Tap and Die Co., Greenfield, Mass., is operating on an increased production schedule. Orders for February were 26 per cent more than those for the same month of last year, and orders for March up to the present time show still larger increase.

The Fitzgibbon & Crisp Co., Trenton, N. J., manufacturer of automobile bodies, is working at a capacity basis, giving employment to a full shop force. Orders on hand are said to insure at least four months continuous operation on this schedule.

The Lackawanna Steel Co., Buffalo, N. Y., has secured an order for 5,000 tons of rails from the Buffalo, Rochester & Pittsburgh Railroad Co. The company has also contracted with the Hocking Valley Railroad for 3,000 tons of rails.

Goodell-Pratt Co. has increased the output of its Shelburne Falls (Mass.) plant and is operating it five days a week with half the normal force.

The Business Barometer

This Week's Outlook in Commerce, Finance, Agriculture and Industry Based on Current Developments

By THEODORE H. PRICE
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In its bearing upon our domestic affairs the most important news of last week was the announcement that the income tax returns filed March 15 indicate that income taxes for the year will be from 30 to 40 per cent under those of 1921. It is said that the decrease is chiefly due to the shrinkage in corporate incomes and those of very rich individuals. This is as it may be, but it will probably be found that the income tax revenue is drying up because the wealth of the country is finding investment in non-taxable securities as those who own it are unwilling to risk it in new enterprises or development under a law which takes a very large share of their profits and leaves them to bear the whole loss of any venture in which they may engage.

Income Tax All Wrong

But whatever the facts it is plain that the income tax will yield nearly a billion dollars less than last year. The last year for which complete statistics of the income tax returns have been published is 1919. The figures show that five-sixths of our income tax revenue in that year was derived from 217,808 persons and 12,071 corporations. Taken in connection with this year's returns they presage the failure of any scheme which seeks to make a negligible portion of the population pay five-sixths of the taxes. They are therefore highly encouraging because they indicate that we shall shortly be compelled to adopt a more rational system of taxation. When this happens and private enterprise is no longer discriminated against by laws which drive capital into tax exempt securities, we shall enter upon a period of genuine prosperity.

But even more important than the income tax returns as a financial illuminant, is a dispatch from Paris which reports that the Swiss government has announced that it will not mint any more gold, and that the Swiss National Banks will not make further loans on gold ingots, because the country is being swamped and demoralized by the gold that is seeking refuge there and for which there is no outlet in international commerce or loans. I have previously called attention to the fact that money is almost unloanable in Switzerland even at 2½ per cent and this attempt to check the influx of gold is a premonition of what may occur in the United States unless we can find a way to employ the plethoric bank reserves that are piling up here as our own gold supply increases.

Last week the Federal Reserve Banks added $11,000,000 in gold to their holdings, and though the reserve ratio declined 2.2 to 75.8 per cent because deposits were increased in preparation for income tax payments, the money market has been almost weak at 4½ per cent for prime commercial paper, 3¾ per cent for eligible bankers acceptances, and 3 per cent for call loans against stock exchange collateral. Under these conditions it is not surprising that new bond issues aggregating over $140,000,000 were readily absorbed. Of this total more than $80,000,000 was for account of foreign borrows. These loans and many others privately arranged and not reported run to a total that almost makes one dizzy. It probably exceeds the record of any similar period in London in its palmiest days. But London is also doing its share and there, as here, the security market was booming nearly all the week and was seemingly unaffected by the troubles in India, the revolutionary strikes in the South African gold mines, of the predicted fall of Lloyd George and his Coalition Cabinet.

These developments, which have led some pessimistic Englishmen to say that there is a close analogy between the present condition of the British Empire and that of Rome as described by Gibbon in the first chapters of his "Decline and Fall," are apparently ignored by financiers on both sides of the Atlantic and we are forced to conclude that Sir Reginald McKenna was right in his contention that abundant credit is more essential than political tranquility to business prosperity.

In this article last week I defined inflation as "the extravagant expenditure of easily borrowed money," and there is every reason to believe that the near future will indicate the accuracy of that definition.

Buy Anything

On the New York Stock Exchange there are many evidences of reviving speculation. One group of stocks after another is being taken up and advanced because the professionals have found that the public are in a buying mood. The market is in fact rapidly approaching the condition which inspires wags to advise their friends to buy "A. O. T." meaning thereby, "any old thing." It is upon this theory the many stocks recently selling at less than two or three dollars a share have doubled in price. Some of them are worthless, but those who buy them are willing to risk the small investment involved because they know that when the public imagination is excited it is easy to give a semblance of value to the valueless. But underneath the whole movement there is a confident expectation of an increase in corporate earnings with the return of business activity and prosperity that will follow the expenditure of the enormous sums now being borrowed on both sides of the Atlantic.

This expectation is warranted by the increase in railway traffic reported from week to week, bank clearings and many other statistical indicia that I have not space to include. The speculative commodities are, it is true, relatively quiescent. Some of them, like wheat, have lost a large portion of their recent advance, but every one seems to be waiting an opportunity to buy and where prices are really low, as in the case of sugar, the demand seems almost insatiable. Rubber and coffee, to whose cheapness I alluded last week, are slowly moving upward. Steel and copper are slightly higher. Wool continues to disappoint those who predicted lower prices. Cotton is "between seasons" but shows great resiliency on any decline, though the bitterness with which the New England strike is being fought out and the reiterated predictions of a coal strike that will include both the anthracite and the bituminous miners, naturally induces industrial and commercial caution. Of the striking cotton operatives in New England it may be said that their success is probable, because rightly or wrongly public sentiment seems to be with them, but of the threatening coal miners this is not true and it is still unthinkable that any group of men can tie up the entire fuel production of this country for any length of time. For these reasons neither the cotton strike nor the threatened coal strike should be counted as permanently depressing influences. Like wars, they must end sometime and peace and prosperity are sequential as well as alliterative.

Exports Falling Down

The figures of our foreign trade for February show that the value of our exports exceeded that of our imports by only $34,000,000. This is the smallest "favorable balance" for any month since September 1914.

It is due not to an increase in imports but a decrease in exports which were valued at only $251,000,000 as compared with $489,000,000 in February 1921. It may be that our exports will be increased again in the near future if we continue to lend money to Europe at the rate indicated by the foreign bond issues floated last week, but a reduction in imports will certainly follow the enactment of the new tariff bill which the Senate is expected to take up as soon as the four-power treaty is ratified, as now seems probable, thanks largely to the patriotic and non-partisan candor of John Sharp Williams. The empty and misleading gestures that are being made with the bonus bill in the House mean nothing. The bill is dead.

The Outlook Is Bright

Conspectively viewed the outlook is highly encouraging. Business is improving from the center, radially, and while the improvement has not yet reached the outer circumference represented by the jobbing and retail trades, there is every reason to expect a general and inclusive increase in activity as the year grows older.

Cleveland Letter

Probably the most important development in the Cleveland, Ohio, district since the turn of the year, at least as it affects the machinery manufacturer and distributor, is the actual gain in orders obtained by the automotive industry in that territory. In a survey just completed by the industrial activities division of the Cleveland Chamber of Commerce, it is estimated that at the present rate of progress in the automotive field 25 per cent of Cleveland's industries will feel the effect of this improved business. The lines most likely to be affected for the better would be leather, glass, textiles, brass, copper, foundry, iron and steel, and a wide variety of minor interests.

For example, this reflection already is seen in more than thirty plants which are members of the East End Manufacturers Association. These plants have shown gains of 5 per cent per month for the last four months, bringing the production up to 35 per cent of normal. It is believed by many that by May these plants will be operating 50 per cent, or showing a gain of 66 per cent since last December.

Edward S. Jordan, head of the Jordan Motor Car Co., just back from a trip through the Central West, asserts that the farmer again is in a buying mood, and is probably figuring on buying a new car. The Jordan plant in Cleveland, Mr. Jordan says, is making twenty-five cars a day now, or three times the output of a year ago. The same prospects for this particular plant will be guaranteed for another ninety days at least, plant officials assert.

Figures on production at the plant of the Peerless Motor Car Co. in Cleveland indicate that March will show double the output of the beginning of the year. Here, as elsewhere in the local automotive industry, stabilization of prices is firmly believed.

The far-reaching effect of the improvement in automotive business here is shown by the substantial orders being received by the Gustave Schaefer Wagon Co., which recently closed a large order for truck bodies from the White Company, which requires this production to supply new demands of the American Railway Express. Steady increase in bus bodies from street railways likewise is noted here.

Radio Craze in Detroit

Detroit seems to be in the grip of the radio craze at this writing. Several specialty manufacturing companies are devoting their entire facilities to the production of radio telephone sets. A few new concerns have been started in the past few weeks to manufacture sets of all sizes and price. The Burroughs Specialty Co., has received an order for 10,000 complete radio sets. Other companies report large orders for the same product.

Cadillac School Resumes

The Cadillac Motor Car Co., Detroit, Mich., has reopened its local technical school for automobile mechanics, temporarily discontinued a number of months ago. Conditions have now so nearly returned to normal in the automotive industry that it has been deemed advisable to resume at the school.

Taylor Society Meeting In Philadelphia

The spring meeting of the Taylor Society was held at the City Club, Philadelphia, March 16, 17 and 18 and was well attended. A noticeable feature of the program was the enlarging of the scope of the society to include other phases of management beside production. This was shown by several of the papers, beginning with that of John M. Holcombe, Jr., manager of sales research division, Phoenix Mutual Life Insurance Co., which has been making a study of selling problems such as the selection of salesmen and the best classes of prospects. Taking a somewhat similar course to that used in selecting the risks for insurance, they have been working out a law of averages for selecting salesmen. This includes a history of the applicant, his education, his tendencies and experience. Henry P. Kendall of Boston, gave a splendid talk on the "Problem of the Chief Executive," also pointing out the growth of the society in handling problems other than production. Taking a medium sized industry as an example, an industry small enough to demand a knowledge of the business on the part of the executive and yet large enough to make it necessary for him to be free from details, he analyzed the problems which have presented themselves during the stress of the past few years. He pointed out how industries varied. In the cotton mill industry for example, material was twice labor and salaries; in some lines engineering was simply maintenance while in others it was the most important factor.

Considering advertising as a tool of sales, he cited cases where the advertising manager had developed into the manager of merchandising and dwelt on the need of a much better understanding of what merchandising really is. It is a science which has not been developed as such. Real merchandising must know possible markets, production of various competitors and many facts which are now merely guesses or poor information. Trade associations are tending to remedy this condition.

The balance sheet should be more and more a guide to the executive than in the past. The controller is a more important man than is usually recognized even though he has been characterized as the pessimist of the organization. He is the one who puts the brakes on over expansion, who points out what is to happen next year—and who has saved many a concern during the present crisis.

The other papers were "Super-Standards," by Frank B. and L. M. Gilbreth; "Budget Control," by Geo. E. Frazer; "Mills and Minds," by Arthour Pound; "String Board Graphics," by Percy S. Brown, and "Work of the Balance of Material Clerk," by Thomas W. Mitchell. Extracts of these will appear later.

Owing to the absence of Mr. Gilbreth, who is in Europe, the paper on "Super-Standards" was presented by Mrs. L. M. Gilbreth, so ably as to win the approval of all present. She pointed out that the term "super-standard" was not a desirable term, but was only used to designate the best known practice of today; and that the super-standard of today became the standard of tomorrow.

Chicago Letter

Another week has passed without any definite change in the trend of business in the machine tool industry. Buying remains spotty and consists mostly of small and miscellaneous machinery. However there are a few exceptions, where orders, transfers, or prospects for orders of considerable size were involved.

The Western Clock Co., LaSalle, Ill., recently placed an order with a local dealer for twenty-four automatic screw machines.

Inquiries are as optimistic as ever. The Universal Portland Cement Co., Buffington, Ind. has issued a list calling for eight machines and the Santa Fe R.R. system has added a belt-driven combination saw and dado machine and one belt-driven 42-in. band sawing machine.

About $10,000 worth of machinery was destroyed by fire in the shop of the Passenger Elevator Safety Lock Co., 119 North Washington St., Peoria, Ill., this company will in all probability be in the market for machines to replace those damaged.

The Hurley Machine Co., West Twenty-second Street and South 54th Street, Cicero, Chicago, manufacturer of electrically operated washing and ironing machines, has purchased the plant and business of the Superior Machine Co., Dekalb, Ill., manufacturer of similar equipment.

A recent fire on the outskirts of the machinery district, amounting to a loss of $15,000,000 has added a few new prospects to the machine tool dealers lists. A few of the machinery and manufacturing concerns destroyed by the fire have already started operations in new locations and are purchasing machinery to replace that lost in the fire.

Ayer & Lord Tie Co., 80 East Jackson Boulevard, Chicago, will build a two-cylinder creosote plant at Louisville, Ky. The Leonard Construction Co., of Chicago, will be in charge of material buying which will consist mainly of steel tanks, creosote cylinders which are 130 ft. long and 7 ft. 6 in. in diameter, fabricated for 250 lb. pressure, a quantity of train cars, boilers, hydraulic pumps, air compressors and vacuum pumps, besides the necessary piping.

Maney Brothers, of Oklahoma City, were awarded a contract by the Santa Fe system to build the proposed line of the Osage County & Santa Fe Railway Co., from Owen to Pawhuska, about 35¼ miles. C. F. W. Felt, chief engineer of the Santa Fe, at Chicago, is supervising the work.

The Chicago, Indianapolis & Louisville R.R. is in the market for 2,500 tons of rails and the Illinois Central is still in the market for 40,000 tons.

It is understood that the Chicago, Burlington & Quincy R.R., is preparing an extensive list which is expected to be issued within a short time. There is a rumor that the Rock Island R.R. is negotiating for some of the equipment on its recent inquiry, but apparently has not placed orders for any of it.

The Barrett-Cravens Company, manufacturers of Handling Equipment, at present located at 169-173 North Ann St., purchased the four-story building at 1328 W. Monroe St., containing 43,000 sq.ft. of floor space, for $100,000, and which will be occupied on or about May 1.

Chicago Meeting of Engineering Council

Steady advancement of engineering ideals both here and abroad and a growing sense of the need and importance of professional unity were outstanding features of the meeting in Chicago, on March 10, of the executive board of the American Engineering Council of the Federated American Engineering Societies. Reporting to the board on the results of his recent trip through the South and Southwest, Mortimer E. Cooley, president, stated that in every city visited by him he found engineers zealous to aid in expanding the influence of the Federation, the worth of which was coming to be so widely recognized that its growth and permanence were assured.

A wide range of topics was considered by the board.

The Great Lakes-St. Lawrence Waterway project came before the board, which decided that at present it was undesirable to take any action. This matter has been under consideration by the public affairs committee of the council for a considerable period, and the board's decision was reached after opportunity had been provided for a careful study of the report of the international joint commission.

The proposal to urge the elimination from the Fordney Bill of the tax on foreign books in English met with a divided report from the committee on public affairs.

The general question of international engineering federation was considered in many phases and provoked much discussion. Secretary Wallace reported that the proposal to form an international federation of engineers had been given wide consideration and that federation progress was reported from England, Canada, Australia, Sweden, France and Italy.

The committee on procedure recommended that the next meeting be held in Pittsburgh, the latter part of May, and the following meeting, in September or October, in Boston or New York.

Another Navy Sale

The central sales office of the Washington Navy Yard has issued notice of a sale of surplus navy supplies, bids for which will be opened on April 5 by the officer in charge at the Navy Yard. The material up for sale comprises approximately 748,000 lb. of steel shafting, steel rivets and gear steel. The material is divided into two lots which will be sold as units.

Trade Associations To Confer with Hoover

Secretary of Commerce Hoover will hold a conference in Washington with representatives of trade associations, in the Department of Commerce Building, on April 12. The meeting will be for the purpose of discussing ways and means of collecting and disseminating statistical information of the associations through the Department of Commerce. This follows the recent controversy on this subject between the Department of Commerce and the Department of Justice.

League for Industrial Rights Celebrates Twentieth Anniversary

With a meeting in the afternoon and a dinner in the evening, the League for Industrial Rights celebrated the twentieth anniversary of its existence, at the Waldorf-Astoria Hotel in New York, on March 10. An outline of the achievements of the league in labor litigation and in the promotion of sane labor legislation was given by the various members of the legal staff. The speakers at the dinner were J. D. A. Morrow, Walter Gordon Merritt, Hon. Chas. F. Moore and Hon. Carrol L. Beedy. The toastmaster was Hon. Daniel Davenport, general counsel of the league.

Industrial Engineers Have Interesting Program

A tentative outline of the program for the annual spring convention of the Society of Industrial Engineers, which is to be held in Detroit on April 26, 27 and 28, has just been given out by the secretary, George C. Dent. The general theme of the meeting will be the influence of industrial engineering upon the earnings of capital and labor. The speakers have not all been selected but the list is nearing completion.

Joseph H. Roe, president of the society will address the meeting on the first day. His subject will be "The Measurement of Management." E. W. Hulet, vice-president of the White Company, of Cleveland, will be another speaker. He will tell how the industrial engineer may serve the executive. Chester B. Lord, works manager of the Advance-Rumley Co. plant, Battle Creek, Mich., has been assigned the subject, "How can Industrial Engineering Increase the Profits and Insure the Stability of both Capital and Labor." Frank B. Gilbreth has been selected as chairman of the dinner meeting at which the discussion of waste elimination in the field of fatigue will take place.

All the business meetings, luncheons, dinners and the exhibition will be held at Hotel Statler. The entire third floor has been engaged for the convention.

Joint Committee on Small Tool Standardization

The American Society of Mechanical Engineers has appointed a committee to represent it in the work of standardizing small tools and machine tool elements, which work is being undertaken by the National Machine Tool Builders' Association. The Committee consists of: Fred H. Colvin, editor, AMERICAN MACHINIST; H. E. Harris, president, Hubbard, Harris & Howell, Inc.; H. M. Hill, engineer; T. H. Miller, works manager, De Laval Separator Co.; E. R. Norris, director of manufacture, Westinghouse Electric and Manufacturing Co.

The committee to represent the machine tool builders is made up of A. C. Hoefinghoff, Cincinnati Grinder Co.; R. T. Hazelton, Cincinnati Shaper Co.; George Langen, Cincinnati Planer Co.; E. C. Henn, National Acme Co.; R. E. Flanders, Jones & Lamson Machine Co.

A. A. Stevenson To Aid Standardization Work

At the request of Hon. Herbert C. Hoover, Secretary of Commerce, the American Engineering Standards Committee has designated A. A. Stevenson, the retiring chairman of the committee, as a special representative to work with the department in the co-operation between the department's division of simplified practice and the American Engineering Standards Committee.

The division of simplified practice is a co-ordinating unit of the Department of Commerce, assisting in those reductions of excessive variety and other simplifications which many industries are undertaking in order to decrease the cost of production and distribution of manufactured articles. The work of the division was organized in the latter part of 1921 and is now actively under way.

The American Engineering Standards Committee, which serves as a national clearing house for a broad field of engineering and industrial standardization, has offered Secretary Hoover the use of its machinery in carrying out the detailed work on technical projects initiated in the simplification program of the Department of Commerce. The committee hopes to be of great value to Mr. Hoover in this simplification program of the department. It was as a result of this hope that the designation of Mr. Stevenson as a representative of engineers came about.

The American Engineering Standards Committee is maintained jointly by twenty-nine national organizations, including five departments of the Federal Government, nine national engineering societies, and fifteen national industrial associations. There are now similar national industrial standardizing bodies in thirteen foreign countries, all but one of which were formed during or since the war. Of these the British and the German work is the most extensive, but active and important work is going forward in other countries.

Mr. Stevenson, who is a past president of the American Society for Testing Materials and has had a most extensive experience in standardization work, is vice-president in charge of manufacture, of the Standard Steel Works Co., which is a subsidiary of the Baldwin Locomotive Works.

McGraw-Hill Co. Combines Mining Papers

The McGraw-Hill Co. of New York, has purchased the *Mining and Scientific Press* of San Francisco, and on April 1 will consolidate it with the *Engineering and Mining Journal* under the name of *Engineering and Mining Journal-Press*. These two publications are the leading magazines of the metal mining industry, the *Journal* having been established in 1866 and the *Press* in 1860.

J. E. Spurr, editor of the *Journal* will be editor of the combined weekly, while T. A. Rickard, editor of the *Press* will be contributing editor, keeping his residence in San Francisco and representing, in particular, the Coast and western viewpoints.

The combined publications will be issued in New York.

Standardization of Screw Threads

The sectional committee on the standardization and unification of screw threads held an interesting session at the rooms of the American Society of Mechanical Engineers on March 15. This committee is reviewing the work and the progress report of the National Screw Thread Commission, with a view of harmonizing it with American practice in every particular. It is the intention to clarify any points which may have been obscure and to arrive at definite tolerances which are practical for use in American industry as a whole. To this end the members of the committee have been chosen from various industries, including bolt and nut manufacturers, makers of taps and dies, users of both these products and engineers who design machines and specify the fits required.

At this meeting the sectional committee reviewed the report of a subcommittee of seven men which has been studying in detail the National Screw Thread Commission's report for some months. Before the sectional committee makes its final report it hopes to hold informal conferences with the National Screw Thread Commission, with the expectation of harmonizing any differences which may arise.

Business Items

The Vandyck-Churchill Co., machinery dealers, New York City, will remove its general offices from 149 Broadway to 52-54 Vesey St. The change will take place on April 1.

The Defiance Machine Works, Defiance, Ohio, has gone into the hands of a receiver. E. M. Hummer, formerly manager of the concern, has been named receiver by the court.

The interests of Charles H. Wood in the C. H. Wood Company, of Syracuse, N. Y., machinery dealer, have been sold to W. R. Olds, G. E. Ingraham and A. J. Littlejohn, all of Syracuse.

The Craine & Schrage Steel Co. has been organized in Detroit, Mich., by Clyde P. Craine and Arthur A. Schrage, formerly of the Pittsburgh Shafting Co. The new organization has opened offices at 6180 Hamilton Blvd., Detroit.

The Federal Trade Commission has dismissed its recent charge of unfair competition against the Barr Sales Co., of Chicago, engaged in selling road machinery.

The Universal Wrench Co., Ltd., of Windsor, Ontario, Canada, plans to move its plant to Amherstburg.

The partnership between Edward Woods and A. Ouellette, of the Woods-Ouellette Machinery Co., Amherstburg, Ontario, Canada, has been dissolved and in the future the business will be carried on by Mr. Woods.

The Chicago Pneumatic Tool Co., for 1921, reports net income after depreciation charges and Federal taxes of $158,107, against $1,869,093 in 1920. Total income was $259,854, against $1,957,925. The surplus for the year, after allowing for interest charges, was $118,363, against $1,273,061. The balance sheet showed current assets of $9,678,525 and current liabilities of only $1,405,202. The profit and loss surplus at the close of 1921 was $2,375,185.

William H. Ginder was elected president of the Resistant Alloy Casting Co., of New Cumberland, W. Va., at a recent meeting of the directors. Other officers elected were as follows: S. C. Williams, vice-president; Charles E. Douglas, secretary-treasurer; D. D. McIntosh and Lee Llewellyn, directors.

Increase in the capital stock of the Alliance Machine Co. at Alliance, Ohio, from $500,000 to $2,000,000, was recorded this week in Columbus, Ohio. The increase is made to keep pace with the growth of business.

Gropler Brothers, representatives of manufacturers of metal cutting tools, are now located at 16 Hudson St., New York City.

The Tool Sales Co. has opened sales offices in the Hudson-Reade Building, New York City.

The Acme Die Casting Co. has moved its plant from Brooklyn, N. Y., to more spacious quarters at Garwood, N. J.

The Hornell Repair and Construction Co. has taken over the railroad repair work for the Erie Railroad in the entire Susquehanna division. The shops included are the ones at Elmira, Binghamton, Southport, Corning, Hornell, Salamanca and Bradford.

The United States Machinery Manufacturing Co. has been incorporated at Springfield, Mass., for the production of washing machines. Incorporators are Walter D. and Albert D. Clairmont of 5 Elm St., and Clinton Gowdy, all of Springfield.

Bateman & Co., Inc., has reopened its plant for the production of agricultural tools at Chicopee Falls, Mass., after a shutdown of ten weeks.

Announcement has been made that the Western Maryland Railway has entered into a contract with the Dickson Construction and Repair Co., Youngstown, Ohio, under which the Dickson concern will take over the railroad company's maintenance-of-way work.

The Akron Spark Plug Co., Akron, Ohio, has been sued for $22,000 by William Spence, Sr., of Springfield, Ill., a sum he alleges he has loaned the company. The concern has been in the hands of a receiver.

The plant of the Victor Saw Works, at Springfield, Mass., having been idle for several months, has been offered for sale at a price of $175,000. Manufacturing operations of the concern are now centered at Middletown, N. Y., to which place practically all of its machinery was removed.

The United States Government has certified to a discharge of mortgage held against the Farrell Foundry and Machine Co. of Tonawanda, N. Y., in the amount of $348,000. The discharge was signed by Theodore Roosevelt, Jr., Acting Secretary of the Navy. The plant was built during the war by the Government and used for the manufacture of airplane motors.

The Kendell Engineering Co., of Fort Wayne, Ind., engaged in the manufacture of Kendell piston rings, has been incorporated under the state laws of Indiana and is now known as the Kendell Engineering Corporation. No changes in officials have been made. C. A. Kendell remains president; Robert L. Kendell, vice-president and M. W. Cartwright secretary and treasurer.

Personals

HARRY V. HAYMAN, for the past thirteen years sales manager of the Automatic Machine Co., machinery manufacturer, Bridgeport, Conn., has resigned his position with that company to accept one with the Wellman-Seaver-Morgan Co., of Cleveland, Ohio. Mr. Hayman will be sales manager in this new appointment.

VINCENT S. WHITNEY has recently become local sales manager of the Shea Foundry and Machine Co., Fifth St., Bridgeport, Conn.

HUBERT E. BAKER, who for several years has been chief draftsman of Manning, Maxwell & Moore, Inc., Shaw Crane Works, Muskegon, Mich., has been appointed chief engineer.

J. M. BALLENTINE is now employed by the International Harvester Co., Akron, Ohio, as assistant superintendent of the motor truck division.

GARNET C. BROWN has terminated his connection with the L. H. Gilmer Co., of Philadelphia, and is now chief engineer of the automotive equipment division of the United and Globe Rubber Co., Trenton, N. J. Mr. Brown will be located in Detroit, Mich.

ROBERT H. CAMPBELL has resigned as president of the Campbell Engineering Co., Chicago, to become associated with the Wharton Motors Co., Pittsburgh, Pa., in the capacity of vice-president and chief engineer.

WILLIAM H. GRIFFITHS has opened offices in Hartford, Conn., as a consulting mechanical engineer.

JOHN A. HENSE, formerly connected with the Exeter Machine Works, is now Eastern manager for the Northern Fire Apparatus Co., of Minneapolis, Minn., with offices in New York City.

ROBERT H. MCLAIN, previously sales engineer for the power and mining department of the General Electric Co., Schenectady, N. Y., is now connected in a similar capacity with the Maine Electric Co., Portland, Me.

W. H. SACKMAN, who recently resigned as chief engineer of the Light Manufacturing and Foundry Co., of Pottstown, Pa., has been chosen director and chief engineer of the Pennsylvania Gasoline Drill Co., of Philadelphia, Pa.

JOSEPH S. WEBSTER has organized a sales force to be known as Joseph S. Webster & Co., to represent the Kingsford Foundry and Machine Works, Oswego, N. Y., in the New England states. Offices will be established in New Haven, Providence and Boston.

L. S. JONES, general manager of the Lumen Bearing Co., Buffalo, N. Y., has been elected to the board of directors of that concern. He succeeds H. P. Parrock, who has severed his connections with the company.

GEORGE S. SQUIBB, of the Diamond Machine Co., Providence, R. I., has been appointed on the safety code committee of the National Machine Tool Builders' Association.

FRANK E. HARLEY, machine tool salesman for the Fairbanks Company, of New York, has left that concern and

Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

Polishing Machine, Western, No. 10

St. Louis Machine Tool Co., 932 Loughborough Ave., St. Louis, Mo.

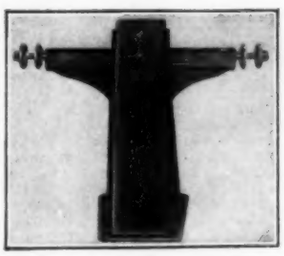
"American Machinist," November 10, 1921.

The machine carries an arbor 48 in. long. The wheels are 38 in. apart and the bearings are 1¼ by 9 in. in size. Low-friction metal is used in the bearings, which are self-oiling. The arbor is made of 40-point carbon steel, and the threads are of square section and coarse pitch. The height of the center of the arbor above the floor is 34 in. The machine can be furnished either with a plain pulley, as shown, or with tight and loose pulleys. Either a plain or a pull-type countershaft can be provided, its weight being 165 lb. The weight of the machine itself is 260 lb.

Polishing Machine, Ball-Bearing, No. 7

St. Louis Machine Tool Co., 932 Loughborough Ave., St. Louis, Mo.

"American Machinist," November 10, 1921.



The arbor, which is 56 in. long and 1¼ in. in diameter in the collars, is supported in four ball bearings, two near the wheels and two near the pulley. The front of the base is vertical, while the rear face is at an angle, so as to increase the floor space of the machine. Also, the rear of the base is 4 in. wider than the front. The total size of the base is 23 x 24 in., and the height to the center of the arbor is 38 inches. The machine can be driven from beneath the floor, the belt being enclosed in the base and a guard being placed over the arbor pulley. The weight of the countershaft is 250 lb. and that of the polishing machine 530 lb.

Grinding Machine, Surface, Swivel-Table, No. 1

Wilmarth & Morman Co., Grand Rapids, Mich.

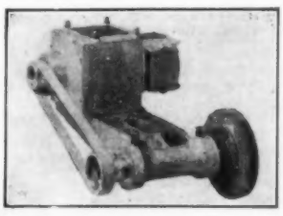
"American Machinist," November 17, 1921.

The use of the auxiliary swiveling table adapts the machine to the performing of grinding operations on angular and irregular shapes. It is not necessary to remove the work from the table and reset it for the angle required; but the auxiliary table can be swung on the sliding table. Graduations are provided at one end to facilitate adjustment. The table is provided with T-slots. It is not necessary to disturb the work to dress the wheel, as the built-in wheel-truing device is located on the hood of the wheel.

Grinder, Electric, Portable, R.V.

Arva Stroud, 327 Broadway, New York, N. Y.

"American Machinist," November 17, 1921.

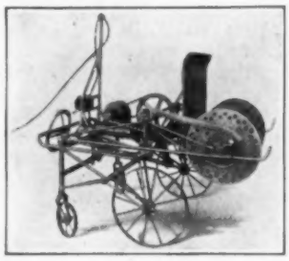


This precision grinder is for general use either on a machine tool or held in a vise. The machine is made in two sizes; the Type A has a ¼-hp. motor, and the Type B a 1-hp. motor. The motor is of the commutator type and operates on either direct or alternating current. It runs at high speed, and is provided with belt drive on two-step pulleys, so as to give spindle speeds of 4,000 and 12,000 r.p.m. under load. The low speed is used for external and the high speed for internal work. Spindle extensions are provided for the latter work. The frame and motor housing are made of an aluminum alloy. The grinding spindle runs on ball bearings. It weighs 22 lb. net and 37 lb. with the accessories.

Sand-Cutting Machine, Hand-Propelled, Type H

American Foundry Equipment Co., 366 Madison Ave., New York, N. Y.

"American Machinist," November 10, 1921.

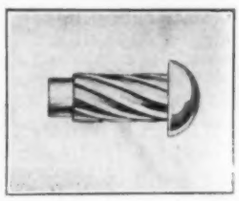


The machine employs power only for the rotating of the cutting cylinder. It is propelled and guided by hand. It weighs less than 700 lb., due to the use of seamless tubing for most of the members. The cutting cylinder, which is 36 in. wide and 26 in. in diameter, is carried in approximate balance upon a frame which can be tilted back by means of a handwheel at the front of the machine, so as to lower the cutting cylinder. The machine is 7 ft. 4 in. over-all in length and 55 in. wide, while its clearance above the floor is 20 in. It is especially intended for use in small foundries, where the sand is ordinarily cut and tempered by means of a hand shovel.

Screw, Drive, Nameplate

Parker Supply Co., Inc., New York, N. Y.

"American Machinist," November 10, 1921.

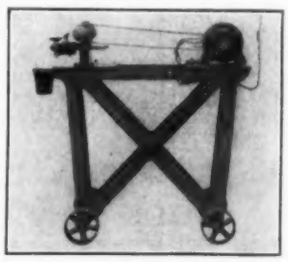


The drivescrew is intended primarily for permanently attaching nameplates and trade marks to machines. It has a thread of very quick pitch and a slotless head. To insert it, holes a trifle larger than the cylindrical point or pilot are drilled, and the screw is driven in with a hammer. Since the screw is hardened, the steep-pitched threads cut their way into gray iron or any soft metal. The screw cannot be removed except by cutting off, thus making it difficult to substitute another name plate for the one originally fastened to the machine.

Grinder, Portable, Motor-Driven

St. Louis Machine Tool Co., 932 Loughborough Ave., St. Louis, Mo.

"American Machinist," November 17, 1921.



The machine has a large stand mounted on wheels, so that it can be moved over irregular surfaces without danger of tipping, being particularly adapted to outside work or yard use for grinding tools and implements. On one end of the stand is mounted a fully inclosed a.c. motor of the induction type. If desired, a compound d.c. motor can be furnished. The wheelhead is mounted at the other end of the stand, and is belted directly to the motor. The machine can be furnished with either No. 1, 2, 3 or 4 "Saint Louis" grinder heads, or No. 0, 1, 2, or 3 "Western" heads. Wheels from 6 to 12 in. in diameter can be carried. The weights vary from 200 to 260 lb.

Coupling, Flexible, Light-Duty, Francke

Smith & Serrell, Central Ave. at Halsey St., Newark, N. J.

"American Machinist," November 17, 1921.

The coupling is intended for use on motor drives up to 50 or 75 hp. It consists of two cast-iron flanges mounted on the shafts to be connected. Both parallel and angular misalignment are corrected by the spring pins connecting the two flanges. At the left of the illustration can be seen one of the flanges, and also the type of flexible pins employed. Six pins are used in the assembled coupling on the right. Each pin unit consists of a bundle of thin, flat steel springs held in keepers at each end. Movement is allowed both lengthwise in the pin and at an angle to it. The coupling is furnished in eight sizes for bores from ⅝ to 3½ in. in diameter. The weights vary from 5 to 70 lb.

has gone to San Domingo, where he will become highway engineer for the government of that country.

W. C. BUELL, of the Diamond Machine Co., Providence, R. I., was the principal speaker at the recent meeting of the salesmen of the Chas. A. Strelinger Co., in Detroit, Mich.

EDWARD W. BECKMAN, was recently appointed superintendent of the foundry department of the Gilbert & Barker Manufacturing Co., Springfield, Mass. Mr. Beckman was formerly with the Dodge Manufacturing Co., at Mishawaka, Ind., and later with the Walworth Manufacturing Co., at the Kewanee, Ill., works.

Obituary

FRANK E. CABLE, one of the organizers of the Porter-Cable Machine Co., of Syracuse, N. Y., died at his home in Newton Center, Mass., on March 7. He retired from active business about two years ago. Mr. Cable organized the Porter-Cable Co. in 1906 to manufacture metal turning lathes, milling attachments and small tools. He was treasurer of the company until his retirement and then he became a director, a position he held at the time of his death.

WALTER S. WILMOT, treasurer of the Bridgeport Hydraulic Co., Bridgeport, Conn., died in that city on March 7.

WILLIAM H. HEGMANN, for the past six years superintendent of the Atlas Crucible Steel Co., at Dunkirk, N. Y., died in Buffalo of sleeping sickness. He was formerly superintendent of the Braeburn Steel Co., at Pittsburgh, and was generally well-known in steel circles.

JOHN SARGEANT, sixty years old, president of the Domhoff & Joyce Co., Cincinnati, Ohio, pig iron brokers, died in Buffalo, N. Y., on March 4. Mr. Sargeant was a prominent figure in the iron and steel industry and was one of the organizers of the Domhoff & Joyce Company.

Book Reviews

Business Administration. By Leon Carroll Marshall, Professor of Political Economy and Dean of the School of Commerce and Administration, University of Chicago. Nine hundred and five 6 x 9-in. pages, green cloth boards. Published by the University of Chicago Press, Chicago, Ill. Price $4; postpaid, $4.25.

The following subjects are dealt with thoroughly and competently: The field of business administration, plant location, the administration of personnel, the administration of market problems, the administration of finance, the administration of production, the administration of risk-bearing, the form of the business unit, basic features of administration, analysis of a business case.

Because it analyzes and clarifies so well the various departments of business, the book is very valuable for use by anyone engaged in or interested in the administration of business, although it was written for use as a text book, to be a part of the series "Materials for the Study of Business."

The author, in his preface, outlines these four parts into which the book may logically be divided: A general view of the field of study and a certain mental attitude toward the field (an attitude called the functional approach to the study of business administration); an examination of a business problem (that of plant location); discussion of the functions of the business administrator, and a "business case" for the student to analyze.

Questions, problems and cases are employed throughout the book as means of instruction and as tests to indicate to the student the extent to which his study has profited him.

The fourth general division of the book, the analysis of a business case, is intended "to get a clearer view of what may be involved in expanding a business" and "to test our ability to form certain kinds of business judgments on the basis of some typical business data." A general, but brief, statement of the case is made and is followed by problems, some of which refer to the engineer's report, the accountant's report, the prospectus and the stock subscription form that follow the problems. The reports referred to afford sufficient data on which to base decisions that are definite solutions of the case as a whole.

On account of the growing realization of a need for collegiate instruction in the fundamentals of business and business administration, Mr. Marshall's book is particularly deserving of recommendation.

Mechanical World Year Book—1922. Published by Emmott & Co., Ltd., Manchester, England., 615 pages, 4¼ x 6¼ in., bound in red clothboards. The book sells for 2s. 6d. in England.

The 1922 edition of a yearly publication of mechanical data. The book this year has been enlarged by the addition of twenty pages to cover new matter. The section on boiler construction has been rewritten and a chapter devoted to pipes and tubes has been added.

The book presents a collection of tables and charts on mechanical subjects. Some of the tables are devoted to weights, measures, thermal properties of solids, liquids and gases, money rates and exchanges, foreign and domestic weights and measures and comparisons with our own systems; post office rates and regulations, both foreign and domestic. Separate chapters are devoted to steam engines, turbines, Deisel engines, shafting, gearing and pulley data, grinding, screw cutting and various other mechanical processes. Several pages are given to tables of squares, cubes and roots, logarithms and trigonometric formulas and equations.

The book is backed up with a diary large enough for the whole year.

Trade Catalogs

Maxim Silencer. The Maxim Silencer Co., Hartford, Conn. Bulletin No. 1, describing the Model 1018 silencer for engine exhausts, suctions, hoists, steam discharges, valves and blow-offs.

Laps. R. & C. Lap Co., Davenport, Iowa. A series of three booklets covering a line of laps for toolroom and production work, with particular reference to automobile cylinder work.

Grinding Machines. The Cincinnati Grinder Co., Cincinnati, Ohio. A sixteen-page catalog describing by word and picture a new automotive parts grinding machine recently put out by this company. The machine is illustrated in various operations and specifications are given.

Safety Setscrews. The Bristol Company, Waterbury, Conn. Bulletin No. 811, describing the Bristo patented safety setscrew.

Twist Drills and Reamers. Whitman-Barnes Manufacturing Co., Akron, Ohio. A four-page circular showing photographs of important engineering projects in the production of which W-B drills and reamers were used.

Alundum. The Norton Company, Worcester, Mass. A beautifully illustrated and made-up catalog, thirty-six pages, on fancy coated stock, describing the alundum safety tile manufactured by this company. The illustrations show the use of tile on stairs, treads, floors, ramps, elevator landings and places where a slip-proof surface is desired. Data for architects, engineers and contractors are included.

Thor Tools. Independent Pneumatic Tool Co., Chicago, Ill. A large folding circular describing a line of Thor tools, including drills, riveters, hammers and hoists, all of the pneumatic type.

Thermo-electric Pyrometers. Thwing Instrument Co., 3339 Lancaster Ave., Philadelphia, Pa. Bulletin No. 10 describing and illustrating a line of electrical instruments for measuring temperatures from the coldest to the hottest.

Gear Cutting. Fellows Gear Shaper Co., Springfield, Vt. First edition of a booklet entitled "A New Development in Gear Cutting," which describes the No. 7 high-speed gear shaper. The machine is illustrated in every detail and some interesting data are furnished.

Catalogs Wanted

H. F. Gray, instructor in mechanical drafting and machine design at Wentworth Institute, Huntington Ave. and Ruggles St., Boston, 17, Mass., would like to receive catalogs on foundry and pattern-making equipment, machine tools and other mechanical apparatus.

TOLNAI VILAGLAPJA, Budapest, Hungary, VII, Dohany-Utca 12, would like to receive catalogs on tools, dies and metal-working machinery.

Forthcoming Meetings

National Metal Trades Association: Annual convention April 17 to 20, Hotel Astor, New York City. H. W. Fisher, 1022 Peoples Gas Building, Chicago, Ill., secretary.

American Gear Manufacturers' Association: Sixth annual meeting, Buffalo, N. Y., April 20 to 22. Secretary, F. D. Hamlin, 4401 Germantown Ave., Philadelphia, Pa.

Southern Supply and Machinery Dealers Association: Annual meeting, Birmingham, Ala., April 24 to 26. (In conjunction with American Supply and Machinery Manufacturers Association.) Secretary, A. M. Smith, c/o Smith-Courtney Co., Richmond, Va.

National Machine Tool Builders' Association: Spring convention, Hotel Traymore, Atlantic City, N. J., April 25 and 26. Ernest F. DuBrul, 817 Provident Bank Bldg., Cincinnati, Ohio, general manager.

National Research Council: Annual meeting of executive board, April 26, Washington, D. C. A. D. Flinn, 29 West 39th St., New York City, chairman.

Society of Industrial Engineers: Annual meeting April 26, 27 and 28, Detroit, Mich. G. C. Dent, 327 La Salle St., Chicago, Ill., business manager.

National Association of Manufacturers: Annual meeting, Waldorf-Astoria Hotel, New York City, May 8, 9 and 10. Secretary, George Boudinot, 50 Church St., New York.

American Society of Mechanical Engineers: Spring meeting, Atlanta, Ga., May 8 to 12. Secretary Calvin W. Rice, 29 West 39th St., New York City.

National Supply and Machinery Dealers Association: Annual Convention, Atlantic City, May 8 to 10. (In conjunction with American Supply and Machinery Manufacturers Association.) Secretary, Thomas A. Fernley, 505 Arch St., Philadelphia, Pa.

Foreign Trade Council: Annual Convention, Philadelphia, Pa., May 10 to 12. Secretary, O. K. Davis, 1 Hanover Square, New York City.

United States Chamber of Commerce: Annual meeting, Washington, D. C., May 16 to 18. Secretary, D. A. Skinner, Riggs Bldg., Washington, D. C.

National Association of Office Managers: Annual meeting, Washington, D. C., May 18 to 20. Secretary, F. L. Rowland.

American Society for Steel Treating: Pittsburgh Section meeting, Bureau of Mines Auditorium, Pittsburgh, Pa., May 25 and 26.

American Foundrymen's Association: Annual meeting, Rochester, N. Y., week of June 5. Secretary, C. E. Hoyt, 140 South Dearborn St., Chicago, Ill.

American Railway Association: Section III, Mechanical: Annual meeting, Atlantic City, June 14 to 21. (Formerly the Master Car Builders and the Association of Master Mechanics.)

American Society for Testing Materials: Twenty-fifth annual meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, June 26 to July 1. Secretary, C. L. Warwick, 1315 Spruce St., Philadelphia, Pa.

Condensed-Clipping Index of Equipment

Patented Aug. 20, 1918

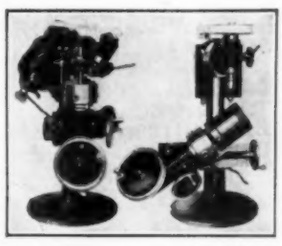
Cleaning Machine, Gasoline, Safety
Black & Decker Manufacturing Co., Baltimore, Md.
"American Machinist," November 17, 1921

The device is intended for cleaning small parts with gasoline. It consists of a cast-iron pedestal with a bowl at the top. About 5 in. from the bottom of the bowl, a fine-mesh screen is supported. A plunger pump is cast integral with the bowl. The cover is arranged so that it cannot be left open when the device is not in use. The operation of the plunger pump forces a stream of gasoline or cleaning fluid from one side into the center of the bowl. The liquid passes through the screen and returns to the pump, so that it is used over and over. It is merely necessary to hold under the stream the part to be cleaned.

Milling Machine, Vertical, High-Speed, No. 5C
Becker Milling Machine Co., Hyde Park, Mass.
"American Machinist," November 24, 1921

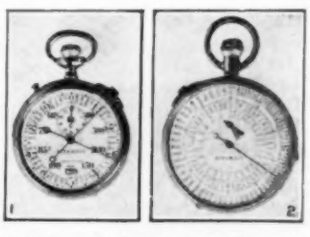
The machine is for special work, so that spindle speeds up to 1,400 r.p.m. may be obtained and cutters as small as 7/32 in. may be used. The normal range of speeds of the standard machine is from 13 to 500 r.p.m., and the high speeds added do not interfere with them. The high speed has been added because it is sometimes necessary to do light milling on large pieces of work. A special three-speed countershaft is furnished. In the work shown, a groove is milled tangent to the circular wall previously milled, and about 1 in. below the top face of the work. A bushing is provided for supporting the cutter close to the surface being milled.

Grinding, Drilling and Turning Machine, Bench, Parker
Ex-Cell-O Tool and Manufacturing Co., Detroit, Mich.
"American Machinist," November 24, 1921



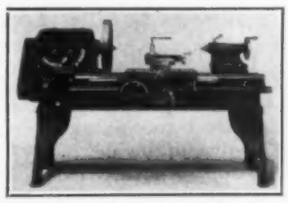
The upper spindle head can be set at any angle about a horizontal axis, being directly connected to the ½-hp. motor. The upper spindle has 1⅛-in. travel. The lower spindle has 2½ in. vertical travel, 8¾ in. vertical adjustment and 7 in. horizontal travel. The machine weighs 135 lb., and is 24 in. high. Both external and internal grinding operations can be performed, as well as any class of cutter grinding. By inserting a tool in the lug to the left of the upper spindle, small turning operations can be done. By placing a drill chuck on the upper spindle, small drilling or milling operations can be performed.

Watches, Time-Study
Mortimer J. Silberberg Co., Peoples Gas Bldg., Chicago, Ill.
"American Machinist," November 24, 1921.



A decimal-graduated, two-handed, computing, time-study watch is shown in Fig. 1. The dial is graduated in tenths and hundredths of minutes, to indicate at any point of elapsed time what the output per hour totals on the work in process. A sliding stop is provided by which the watch may be started, stopped and started again without returning the hands to the zero position. The watch shown in Fig. 2 is known as the "decimal duration" type. The small hand records the revolutions of the large hand up to and including 30 minutes.

Lathes, Production, Quick-Change, Type-S
Sebastian Lathe Co., Cincinnati, Ohio.
"American Machinist," November 24, 1921

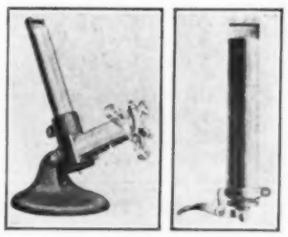


The lathe is made in swings of 13, 15 and 18 in. It can be furnished in either the geared-head or cone type. The bed can be furnished in lengths from 5 to 14 ft. in the two smaller sizes of machine, and from 6 to 14 ft. in the largest size. The geared headstock provides speeds from 19¼ to 487 r.p.m. for the 13- and 15-in. sizes, and from 14 to 350 r.p.m. for the 18-in. size. The geared headstock can be used with a double friction countershaft or with a motor drive. A thread-chasing dial is regularly furnished. The quick-change box provides for the cutting of threads from 3 to 48 per inch, and gives feeds from 6 to 96 per inch.

Grinders, Motor-Driven, Belted
St. Louis Machine Tool Co., St. Louis, Mo.
"American Machinist," November 24, 1921

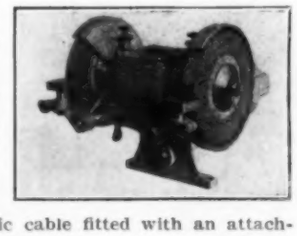
The motor is carried on a heavy arm fastened to the rear of the pedestal. It is thus protected both from the dust and dirt that ordinarily accumulate on a motor mounted on the floor, as well as from the action of grit that is apt to find its way into a motor mounted directly on the grinding spindle. The addition of the motor does not increase the floor space required by the machine, and does not interfere with the operator. Motors can be furnished for the type of current available. The starting switch is mounted beneath the motor. The machine can be furnished with practically any type or size of head used on the regular line of "Saint Louis" and "Western" grinders and polishers.

Minimeter, Hirth
Coats Machine Tool Co., Inc., New York, N. Y.
"American Machinist," November 24, 1921



The concern is marketing a complete line of the original Hirth minimeters. The minimeter proper, an instrument for precision measurement, is shown at the right. It consists essentially of a lever having unequal arms and resting on two knife edges. The ratio of amplification may vary from 1:50 to 1:1,000, depending on the accuracy to which it is desired to gage. The measuring instrument proper can be mounted in different types of holders. One application of the minimeter is the inspection of balls requiring high accuracy. The type shown is intended for measuring holes. Another recent model is intended for gear inspection.

Grinder, Electric, Bench, 8-In.
Black & Decker Manufacturing Co., Baltimore, Md.
"American Machinist," November 24, 1921



The machine has a ¾-hp. motor capable of operation on either alternating or direct current. The motor is air cooled, and arranged so that the cooling-air intake is located 12 in. from the grinding wheels. The wheels are set forward of the motor casing, so that they overhang the bench. It is possible to grind long pieces and odd shapes without interference from the casing. The machine is equipped with two 8 x ¾-in. grinding wheels, wheel guards, adjustable toolrests, and an electric cable fitted with an attachment plug and switch.

Clip, paste on 3 x 5-in. cards and file as desired

The Weekly Price Guide

THIS WEEK'S MARKET

PITTSBURGH mills, with few exceptions, are holding firmly to the asking price of $1.50 per 100 lb. on structural shapes, plates and mild steel bars. Only in exceptional cases, involving large tonnages, is the quotation of $1.40 easily obtainable.

Copper sheets (base), in New York warehouses, are quoted at 19½c.@20½c. as compared with 20½c.@21c. per lb. one week ago. Copper market continues to show improvement; zinc somewhat firmer. Dealers' purchasing prices on old copper and brass quoted at an advance of ¼c.@½c. per lb. in Cleveland.

Raw linseed oil quoted in Chicago at 97c. as against 91c. per gal. New York continues to quote 87c., but cutting under this figure to the extent of 3c. has resulted in quotations ranging from 84c. to 87c. per gal. in 5-bbl. lots.

IRON AND STEEL

PIG IRON—Per gross ton—Quotations compiled by The Matthew Addy Co.:

CINCINNATI	
No. 2 Southern	$21.17
Northern Basic	19.71
Southern Ohio No. 2	21.02
NEW YORK—Tidewater Delivery	
Southern No. 2 (Silicon 2.25 to 2.75)	28.16
BIRMINGHAM	
No. 2 Foundry	15.50
PHILADELPHIA	
Eastern Pa., No. 2x, 2.25-2.75 sil	21.26
Virginia No. 2	27.24
Basic	19.84
Grey Forge	20.50
CHICAGO	
No. 2 Foundry local	21.70
No. 2 Foundry, Southern, sil 2.25@2.75	21.67
PITTSBURGH, including freight charge from Valley	
No. 2 Foundry	20.46
Basic	19.46
Bessemer	21.96

IRON MACHINERY CASTINGS—In cents per pound:

	Light	Medium	Heavy
Pittsburgh	9.0	6.0	3.5
Philadelphia	8.0	5.0	2.63
Atlanta	5.0	4.0	3.5

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the base quotations from mill:

Blue Annealed	Pittsburgh, Large Mill Lots	New York	Cleveland	Chicago
No. 10	2.25	3.28	3.10	3.38
No. 12	2.30	3.33	3.15	3.43
No. 14	2.35	3.38	3.20	3.48
No. 16	2.55	3.48	3.30	3.58
Black				
Nos. 17 and 21.	2.85	3.80	3.55	3.95
Nos. 22 and 24.	2.90	3.85	3.60	4.00
Nos. 25 and 26.	2.95	3.90	3.65	4.05
No. 28	3.00	4.00	3.75	4.15
Galvanized				
Nos. 10 and 11.	3.00	3.75@3.90	3.75	4.15
Nos. 12 and 14.	3.10	3.85@4.00	3.85	4.25
Nos. 17 and 21.	3.40	4.15@4.30	4.15	4.55
Nos. 22 and 24.	3.55	4.30@4.45	4.30	4.70
No. 26	3.70	4.45@4.60	4.55	4.85
No. 28	4.00	4.75@4.90	4.75	5.15

WROUGHT PIPE—The following discounts are to jobbers for carload lots on the latest Pittsburgh basing card:

Steel Inches	Black	Galv.	BUTT WELD Inches	Iron Black	Galv.
1 to 3	71	58½	⅜ to 1½	44½	29½
LAP WELD					
2	64	51½	2	39½	25½
2½ to 6	68	55½	2½ to 4	42½	29½
7 to 8	65	51½	4½ to 6	42½	29½
9 to 12	64	50½	7 to 12	40½	27½
BUTT WELD, EXTRA STRONG, PLAIN ENDS					
1 to 1½	69	57½	⅜ to 1½	44½	30½
2 to 3	70	58½			
LAP WELD, EXTRA STRONG, PLAIN ENDS					
2	62	50½	2	40½	27½
2½ to 4	66	54½	2½ to 4	43½	31½
4½ to 6	65	53½	4½ to 6	42½	30½
7 to 8	61	47½	7 to 8	35½	23½
9 to 12	55	41½	9 to 12	30½	18½

Malleable fittings. Classes B and C, Banded, from New York stock sell at net list. Cast iron, standard sizes, 20–5% off.

WROUGHT PIPE—Warehouse discounts as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	66%	53%	60½%	47½%	62½%	48½%
2½ to 6 in. steel lap welded	61%	47%	58½%	44½%	59½%	45½%

Malleable fittings. Classes B and C, Banded, from New York stock sell at list less 10%. Cast iron, standard sizes, 32–5% off.

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Open hearth spring steel (base)	4.00	6.00	4.50
Spring steel (light) (base)	6.00	6.00	6.00
Coppered Bessemer rods (base)	7.00	8.00	6.03
Hoop steel	3.38	2.96	3.13
Cold rolled strip steel	6.25	8.25	6.50
Floor plates	4.60	4.56	3.40
Cold finished shafting or screw	3.35	3.25	3.40
Cold finished flats, squares	3.85	3.75	3.90
Structural shapes (base)	2.63	2.46	2.63
Soft steel bars (base)	2.53	2.36	2.28
Soft steel bar shapes (base)	2.53	2.36	2.28
Soft steel bands (base)	3.13	....	2.88
Tank plates (base)	2.63	2.46	2.38
Bar iron (2.00@2.10 at mill)	2.53	3.52	2.78
Drill rod (from list)	55@60%	55%	50%
Electric welding wire:			
⅜	8.50		12@13
⅛	7.15		11@12
5/16 to ¼	6.75		10@11

High speed steel is quoted in Cleveland at 90c. per lb.

METALS

Current Prices in Cents Per Pound

	New York	Cleveland	Chicago
Copper, electrolytic (up to carlots), New York			13.62½
Tin, 5-ton lots, New York			30.25
Lead (up to carlots), St. Louis, 4.65; New York			5.00
Zinc (up to carlots), St. Louis, 4.77½; New York			5.12½
Aluminum, 98 to 99% ingots, 1-15 ton lots	19.20	20.00	18.00
Antimony (Chinese), ton spot	5.50	6.50	6.75
Copper sheets, base	19.50@20.50	20.50@21	23.00
Copper wire (carlots)	14@14.25	17.00	16.25
Copper rods (ton lots)	19.25	21.50	19.50
Copper tubing (100-lb. lots)	20.75	22.50	23.00
Brass sheets (100-lb. lots)	16.25	16.50	18.75
Brass tubing (100-lb. lots)	18.00	18.50	20.50
Brass rods (1,000-lb. lots)	14.25	15.00	15.75
Brass wire (carlots)	16.75	16.50	.....
Zinc sheets (casks), (8% dis. carlots)	10.50	9.15	15.75
Nickel (ingot and shot), Bayonne, N. J.	41.00	.....	.....
Nickel (electrolytic), Bayonne, N. J.	44.00	.....	.....
Solder (½ and ½), (case lots)	19.00	22.00	19.00
Babbitt metal (best grade)	32.00	41.00	36.00
Babbitt metal (commercial)	16.50	13.50	9.00

—Shop Materials and Supplies

SPECIAL NICKEL AND ALLOYS—Price in cents per lb.

Malleable nickel ingots	45
Malleable nickel sheet bars	47
Hot rolled rods, Grades "A" and "C" (base)	60
Cold drawn rods, Grades "A" and "C" (base)	72
Copper nickel ingots	37
Hot rolled copper nickel rods (base)	45
Manganese nickel hot rolled (base) rods "D"—low manganese	64
Manganese nickel hot rolled (base) rods "D"—high manganese	67

Base price of monel metal in cents per lb., f.o.b. Bayonne, N.J.:

Shot	35.00	Hot rolled machined rods (base)	53.00
Blocks	35.00	Hot rolled rods (base)	42.00
Ingots	38.00	Cold drawn rods (base)	56.00
Sheet bars	40.00	Hot rolled sheets (base)	55.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Copper, heavy, and crucible	10.00	10.50	10.50
Copper, heavy, and wire	9.50	10.00	9.50
Copper, light, and bottoms	8.50	8.50	8.75
Lead, heavy	3.75	3.50	3.50
Lead, tea	2.75	2.50	3.00
Brass, heavy	5.75	5.50	8.50
Brass, light	4.25	4.25	5.00
No. 1 yellow brass turnings	5.00	5.00	5.25
Zinc	2.75	2.00	2.50

TIN PLATES—American Charcoal Plates—Bright—Cents per lb.

		New York	Cleveland	Chicago
"AAA" Charcoal Melyn Grade:				
IC,	20x28, 112 sheets	20.00	18.25	18.50
IX,	20x28, 112 sheets	22.50	21.00	20.90
"A" Charcoal Allaways Grade:				
IC,	20x28, 112 sheets	17.00	16.00	17.00
IX,	20x28, 112 sheets	20.00	18.75	19.60
Coke Plates, Bright				
Prime, 20x28 in.:				
100-lb.,	112 sheets	12.50	12.00	14.50
IC,	112 sheets	12.80	12.30	14.80
Terne Plate				
Small lots, 8-lb. Coating:				
100-lb.,	14x20	7.00	5.60	7.25
IC,	14x20	7.25	5.85	7.40

MISCELLANEOUS

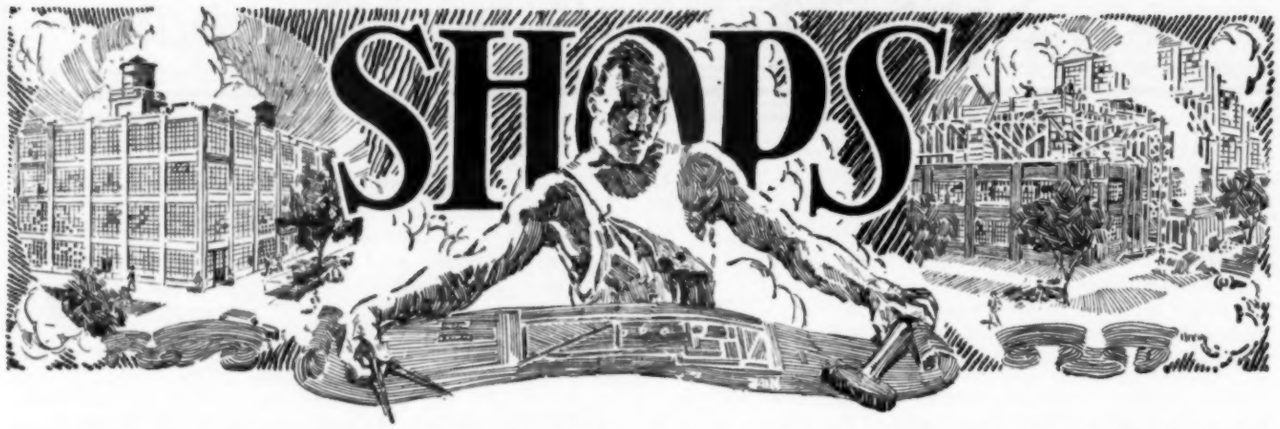
	New York	Cleveland	Chicago
Cotton waste, white, per lb	$0.07½@$0.10	$0.12	$0.12
Cotton waste, mixed, per lb	055@.09	.09	.09
Wiping cloths per M., 13¼x13¼	.....	50.00	55.00
Wiping cloths per M., 13¼x20½	.....	55.00	65.00
Sal soda, 100 lb. lots	2.80	2.50	2.65
Roll sulphur, 360 lb. bbl., per 100 lb	2.85	3.25	3.50
Linseed oil, per gal., 5 bbl. lots	.84@ 87	.99	.97
White lead, dry or in oil	100 lb. kegs.	New York, 12.25	
Red lead, dry	100 lb. kegs.	New York, 12.25	
Red lead, in oil	100 lb. kegs.	New York, 13.75	
Fire clay, per 75 lb. bag		.80	1.00
Coke, prompt furnace, Connellsville	per net ton	$3.25@3.50	
Coke, prompt foundry, Connellsville	per net ton	4.25@4.75	

SHOP SUPPLIES

Current Discounts from Standard Lists

	New York	Cleveland	Chicago
Machine Bolts:			
All sizes up to 1x30 in.	60-5%	60-10%	60-10-10%
1½ and 1¼x3 in. up to 12 in.	50%	60-10-10%	60-10%
With cold punched sq. nuts	50%	.....	....
With hot pressed hex. nuts up to 1x30 in. (plus std. extra of 10%)	55%	.....	$4.00 off
Button head bolts, with hex. nuts	35%	$3.90 net	.....
Hex. head and hex. nut bolts	40%	.....	65-5%
Lag screws, coach screws	65%	.....	60%
Square and hex., head cap screws	75—10%	75%	.....
Carriage bolts, up to 1 in. x 30 in.	50-10%	60-10%	50-5%
Bolt ends, with hot pressed nuts	60%	.....	55%
Tap bolts, hex. heads	25%	.....	.....
Semi-finished nuts ⅝ and larger	75%	75-10%	80%
Case-hardened nuts	65%	.....	.....
Washers, cast iron, ½ in., per 100 lb. (net)	$4.50	$3.50	$3.50
Washers, cast iron, ⅜ in. per 100 lb. (net)	3.75	3.50	3.50
Washers, round plate, per 100 lb. Off list	4.00	....	3.50 net
Nuts, hot pressed, sq., per 100 lb. Off list	3.00	3.50	4.00
Nuts, hot pressed, hex., per 100 lb. Off list	3.00	3.50	4.00
Nuts, cold punched, sq., per 100 lb. Off list	3.00	3.50	4.00
Nuts, cold punched, hex., per 100 lb. Off list	3.00	3.50	4.00
Rivets:			
Rivets, 7/16 in. dia. and smaller	60-5%	60-10-10%	65-5%
Rivets, tinned	60-5%	60-10-10%	4½c. net
Button heads ¾-in., ⅞-in., 1x2 in. to 5 in., per 100 lb (net)	$3.50	$3.25	$3.00
Cone heads, ditto (net)	3.60	3.35	3.10
1¼ to 1¾-in. long, all diameters, *EXTRA* per 100 lb	0.25	.....	0.15
⅝ in. diameter *EXTRA*	0.15	.....	0.15
½ in. diameter *EXTRA*	0.50	.....	0.50
1 in. long, and shorter *EXTRA*	0.50	.. ..	0.50
Longer than 5 in. *EXTRA*	0.25	.....	0.25
Less than 200 lb *EXTRA*	0.50	.....	0.50
Countersunk heads *EXTRA*	0.35	.....	$3.35 base
Copper rivets	60-5%	50%	50-10%
Copper burs	40%	50%	.....
Lard cutting oil (50 gal. bbl.) per gal.	$0.65	$0.50	$0.55
Machine oil, lubricating, (50 gal. bbl.) per gal.	0.45	0.35	0.40
Belting—Present discounts from list in fair quantities (½ doz. rolls)			
Leather:			
Light grade	50%	50-5%	60-10%
Medium grade	40-5%	40-10-2½%	50%
Heavy grade	35%	40%	40-5%
Rubber and duck:			
First grade	60-5%	50-10%	.....
Second grade	60-10-5%	60-5%	60-5%
Abrasive materials—In sheets 9x11 in.:			
No. 1 grade, per ream of 480 sheets, Flint paper	$5.84	$3.85	$6.48
Emery paper	8.80	11.00	8.80
Emery cloth	27.84	32.75	29.48
Flint cloth, regular weight, width 3½ in., No. 1 grade, per 50 yd. roll,	4.50	....	4.95
Emery discs, 6 in. dia., No. 1 grade, per 100.			
Paper	1.32	.....	1.49
Cloth	3.02	.....	3.20

NEW *and* ENLARGED



Machine Tools and Machinery Wanted

Machine-tool wants published without charge

Ala., Birmingham — The Birmingham Slag Co., Jefferson County Bank Bldg., G. Ireland, Pres.—three pneumatic drillers for drilling holes for blast charges in slag bed.

Ala., Birmingham — The Ingalls Iron Wks., 802 Ave. D—serpentine shear, for 1-4 in. and lighter sheets.

Ala., Mobile—The Alabama Drydock Co., foot of Eslava St., A. Reddy, Purch. Agt. —two 27 in. LeBlond lathes and one No. 4 LeBlond milling machine.

Ark., Hope—The Eclipse Mfg. Co., H. H. Howel, Pres.—one high speed drilling apparatus for drilling rivet holes in sheets for tanks, similar to that used for ship plates for bending machine to be used for bending plates 48 in. and under.

Cal. Los Angeles—Globe A No. 1 Ice Cream Co., c/o W. A. Heitman Constr. Co., 900 Merritt Bldg.—electric elevator and conveyors also refrigeration system and modern ice cream making machinery.

Fla., Cantonment—The Cantonment Merchantile Co., H. I. Root, Secy.—complete line of canning factory machinery for small cannery, also creamery and dairy machinery.

Ga., Eatonton—The Eatonton Cotton Mills, F. W. Gurry, Pres. and Mgr. — twenty-nine hundred 3 in. and eight hundred 5 in. spindles for cotton mill.

Ga., Savannah—W. Ross, c/o Hotel Martinique—complete supplies and machinery for proposed newspaper plant.

Ia., Marshalltown—E. A. Ford, oil drill.

Ill., Chicago—The Cadet Knitting Co., 1754 Belmont Ave.—one Scott & Williams body machine 15 in. diameter with 16 end Crawford stop motion.

Ill., Chicago—The Chicago Roller Skate Co., 4458 West Lake St., R. Ware, Purch. Agt.—one vertical wet surface grinder about 14 x 36 with or without magnetic chuck, and one ¼ in. high speed hammer riveter.

Ill., Chicago—The Quadrangle Mfg. Co., 551 West Monroe St.—one 52 to 60 in. power square shear to cut 14 gauge steel, (used).

Ill., St. Anne—The Builders Specialty Co.—machine work and assembling lathe, swing up to 40 in. also a planer and a drill press.

Ind., Buffington (Gary P. O.)—The Universal Portland Cement Co.—one 60 in. x 26 ft. heavy duty type engine lathe.
One 84 in. vertical boring mill.
One 1,000 lb. single frame steam hammer.
One No. 1 horizontal spindle milling machine with table 14 in. x 8 ft.
One 4 head quick return planer with bed 42 in. wide and 12 ft. long.
One type "J" Gisholt turret lathe with 28 in. swing and 7⅛ in. spindle bore.
One 24 in. x 15 ft. engine lathe.
One cold cut circular saw to cut material up to 12 in. in diameter, inclusive.

Kan., Wichita — The Central Furniture Co., South Santa Fe St.—woodworking machines, including planer, shaper, rip saw, etc.

Kan., Wichita—The Empire Sand & Material Co., 102 Northern Bldg.—mixer, conveying equipment, steam boiler and miscellaneous equipment.

La., Shreveport—W. E. Hampton, 725 Christian St.—additional machinery for the manufacture of machinery etc.

Mass., Boston—Perkins & Boland, 176 Federal St. (manufacturers of cotton yarn) —late model chinchilla machine Curtis & Marble make preferred.

Mich., Detroit — The Batchelder-Wasmund Co., 2300 West Jefferson Ave., D. W. Davie, Purch. Agt.—lathe for turning stone.

Mich., Detroit—The Grosse Pointe Sheet Metal Wks., 14538 Jefferson Ave., E.—woodworking machine.

Mich., Detroit—The Ka-Wood Gear Co., 2281 Superior St.—miscellaneous machine shop equipment, including heavy press.

Mich., Detroit—Lamb Co., 1938 Franklin St.—small screw machines plain, small screw machines automatic, and small punch presses about No. 2 or No. 3.

Minn., Minneapolis—B. W. and L. Harris Co., 2407 University Ave., S. E., general machine shop operators—machine tools for equipping new plant.

Minn., Minneapolis—The Liberty Garage, 524 10th St., S., F. J. Mason, Purch. Agt. —equipment for auto repair shop.

Minn., New Prague—The Gopher Machine Mfg. Co. has sent out a printed list of machine tool and machinery requirements.

Minn., St. Paul—The Dept. Educ., City Hall, H. W. Austin, Purch. Agt.—
One tenoner, 24 in. capacity slide 3½ tenon, complete with all knives and belts, tilting table for angle tenonizing motor 3 phase, 60 cycle, 220 volt, Oliver No. 125 less cutoff attachment, or similar.
One bench trimmer, Oliver No. "O" or similar.
One hollow chisel mortiser motor drive on spindle, motor 3 phase, 60 cycle, 220 volt, Oliver No. 91D or similar.
One variety saw, complete with motor belt drive, mortising and boring attachment with all chisels, universal ripping fence, plain table, including one rip saw and one cut-off saw, motors 3 phase, 60 cycle, 220 volt, Oliver No. 80 or similar.

Mo., Joplin—The Auto Service Co., 108 North Main St., L. C. Martin, Purch. Agt. —lathe for garage and machine shop.

Mo., Joplin—The city, J. M. Lane, comr. —lathe and other small tools for machine shop.

Mo., Joplin—The Creech Auto Repair Co., 209 East 20th St., T. Creech, Purch. Agt.—lathe, drill press, emery wheel and stand.

Mo., Joplin—The Lewis Machine Co., 206 Joplin St.—large lathe and drill press for machine shop.

Mo., Joplin—The Miners Ice & Fuel Co., 318 Main St.—J. E. Campbell, Mgr.—compressor about 450-500 cu.ft. free air, 110 lb. working air pressure, steam driven.

Mo., Joplin—The Second Street Garage, 2nd St.—R. Cassnier, Purch. Agt.—lathe, drill press, shafting and belting.

Mo., Joplin—L. Stites, 1415 Main St.—drill press, lathe and shafting.

Mo., Springfield—The Wilhoit Oil Co., 718-21 Woodruff Bldg., E. M. Wilhoit, Purch. Agt.—oil filtering machinery.

N. Y., Albany—C. L. Cadle, Supt. Pub. Wks., will receive bids until April 11 for two 5 ton electric gantry cranes on Barge Canal Terminals at Rochester and Syracuse, Terminal Contr. 122.

N. Y., Binghamton—The A. & J. Mfg. Co., 340 Water St.—special machinery and equipment for the manufacture of metal egg-beaters.

N. Y., Buffalo—The Amer. Radiator Co., 1807 Elmwood Ave.—two 24 in. and six 16 in. Barnes drill presses; one high speed drill press; one radial drill press 36 in. arm; one shaper, 24 in. stroke; one 20 in. lathe, 7 ft. center; one milling machine; one Brown & Sharpe universal grinder and one power hack saw.

N. Y., Buffalo—The Hess Rubber Wks., 522 Bway.—complete vulcanizing outfit and machinery.

N. Y., Buffalo—J. U. Landsittel, 276 Glenwood St.—small printing press.

N. Y., Carthage—D. J. Renaud & Son, Inc., 672 West End Ave.—small oil burning brass furnace.

N. Y., Manchester—A. J. Butterfield—tinsmithers and roofers tools and machinery.

N. Y., Watertown—The Biche-Gardner Motor Co., Stone St.—1 7/16 in. cold rolled shafting, 14 in. hangers and one 12 in. x 8 in. split steel pulley.

N. Y., Watertown—The Brennan Eng. Co., Mill St., M. Brennan, Purch. Agt.—pipe tapping and threading machine and portable volt-meter with case.

N. Y., Watertown—Gray Bros. Vulcanizing Wks., Inc., 436 State St., A. J. Gray, Purch. Agt.—triple chain hoists, ½ and 1½ ton.

N. C., Chalybeate Springs—W. J. Morris—machine to handle gravel from pit to cars, information on new machine or will consider used track crane.

N. C., Hickory—F. B. Williams, 1503 10th St.—machines to manufacture shoe strings.

N. C., Pembroke—The Honey Sorghum Producers Co-operative Assn.—three roll crusher, evaporator, filter, engine, tank, boiler and various machinery for new canning factory.

O., Cleveland—The Fanner Mfg. Co., Brookside Park, (foundry), J. E. O'Brien, Purch. Agt.—Toledo press, screw machine and several moulding machines.

O., Massillon—The Massillon Aluminum Co.—V. Watt, Purch. Agt.—three 32 in. spinning lathes with sliding tailstock.

Pa., Allentown—The Defiance Auto Lock Corp., R. H. Peterson, Purch. Agt.—hydraulic press, milling machine, lathe and gear cutter.

Pa., Bridgeville—The Universal Steel Co. —shear, Crocodile or Alligator for cutting soft steel billets cold.

Pa., Erie—The Erie County Comrs.—scales to weigh trucks.

Pa., Hawley—E. Ludwig, plumber and steamfitter—pipe threading machine to cut threads on pipe up to 4 in.

Pa., Phila.—G. T. Kershner, 313 North 34th St.—one sole leather stripper.

Pa., Phila.—R. Mari, 5843 Morton St.—dough mixers, conveyors and electric furnaces.

Pa., Phila.—M. Moister & Co., 3931 North 5th St., M. Moister, Purch. Agt.—woodworking machines, drill press, metal working machinery, shafting, hangers, etc.

Pa., Phila.—R. Schleter, Kensington and M Sts., (hosiery mill)—spoolers, winders and cones, also automatic hosiery machines, belting, shafting, etc.

Pa., Pittsburgh—Hubbard & Co., 6301 Butler St., H. G. Glaser, Jr., Purch. Agt.—two 1¼ or 1½ in. Acme heading, forging and upsetting machines with 10 in. stroke.

Pa., Pittsburgh—P. Limegrower, 126 Collins Ave.—electric hoist outfit or 25 hp. gas engine.

Pa., Pittsburgh—H. Muser, 314 38th St.—small drill press, 18 in. power saw and small emery wheel (used).

Pa., Willow Grove—J. Stuckert—one 10 ton ice manufacturing machine (used preferred).

S. C., Sumter—The Sumter Pine Co., 604-605 City Natl. Bank Bldg., R. B. Waters, Secy.-Treas. — complete machinery and equipment for the manufacture of boxes and crates.

S. C., Winnsboro—J. F. Watson—complete woodworking machinery outfit including matchers, planers, sanders, etc., for turning out handles, spokes, etc., from hard wood lumber.

Tenn., Chattanooga—The Chattanooga Roofing & Fdry. Co., Msnry Ave., J. E. Annis, Purch. Agt.—20 in. drill press, upright with stationary head, capacity 1 in. hole in cast iron and steel.

Tenn., Chattanooga—M. B. Parker, 1912 Oak St., manufacturer of machinery, etc.—one 48 x 48 in. x 16 ft. belt driven planer, with two rail heads.

Wis., Beloit—J. H. Saris, 412 Broad St.—modern repair shop machinery, including gasoline storage tanks and pumps and an air compressor.

Wis., Green Bay—The Green Bay Cold Storage Co., 113 West Walnut St.—refrigeration machinery.

Wis., Madison — The Autowash Co., 7 South Bedford St. — equipment for auto repair work.

Wis., Milwaukee — C. Bielefeld, 1161 Grant St., carpentry and millwork—24 in. planer.

Wis., Milwaukee—H. Hawker, 271 Bishop Ave., (woodworker)—22-26 in. band saw.

Wis., Milwaukee — M. Schmidt, 2916 Galena St., carpentry and woodwork—band saw, planer and sander.

Wis., Milwaukee—E. Wiener, 301 7th St.—woodworking machinery for the manufacture of special upholstered furniture.

Wis., Milwaukee—M. A. Weinreis, 241 Lake St.—one 300 to 350 ft., two stage belt driven air compressor and one 8 x 8 x 8 and one 10 x 10 belt driven air compressor.

Wis., Oshkosh—The Gibson Tire & Repair Co., 7 Church St.—one tire press.

Wis., Park Falls—The Flambeau Paper Co., G. Waldo, Purch. Agt.—traveling crane.

Wis., Portage—The Portage Underwear Mfg. Co.—one 18 in., 14 cut, knitting machine.

Wis., Waupun—C. A. Shaler—special machinery for vulcanizing plant.

Ont., Burford—The Paris Knitting Co., Ltd., has secured an old factory building and plans to install equipment for the manufacture of soxs and stockings. Estimated cost, $30,000.

Metal Working Shops

Cal., Fresno—Dolson & Anderson, Inc., 902 Bush St., San Francisco, have awarded the contract for the construction of a 3 story garage and store building at 1215 Bway., here. Estimated cost, $50,000.

Cal., Martinez—The California Car Co., Alexander Bldg., San Francisco, will construct a car plant comprising 1 story buildings, here.

Cal., Oakland—D. Crosby, 105 Sheridan Ave., Piedmont, will build a 1 story battery station on Webster St. near 15th St., here. Estimated cost, $15,000.

Cal., Point Loma — Spec. 4599 — The Bureau of Yards and Docks, Navy Dept., Wash., D. C., plans to build a garage here.

Cal., San Francisco—The York Realty Co., c/o W. L. Schmolle, Archt., 40 Montgomery St., is having plans prepared for the construction of a 1 story auto body factory on Harrison and 21st St., for the Martin-Parry Corp., 500 Golden Gate Ave. Estimated cost, $15,000.

Conn., Hartford—The Bush Mfg. Co., 77 Commerce St., has awarded the contract for the construction of a 1 story, 50 x 250 ft. addition to its plant on Wellington Ave., for the manufacture of machinery. Estimated cost, $60,000. Noted March 2.

Conn., Hartford — Herchman & Levine, 223 Main St., is having revised plans prepared for the construction of a 2 story, 85 x 190 ft. garage, repair shop and sales building on Main St. Estimated cost, $125,000. F. C. Walz, 407 Trumbull St., Archt.

Conn., New Britain—A. J. Olson, 334 Stanley St., is having plans prepared for the construction of a 1 story, 112 x 132 ft. garage, etc., on Arch St. L. A. Oldershaw, 259 Main St., Archt.

D. C., Washington—The Salvation Army, 521 13th St. N. W., has awarded the contract for the construction of a garage and industrial home. Estimated cost, $200,000. Noted March 9.

Ill., Charleston—A. E. Craig, c/o C. D. Mitchell, Archt., Mitchell Blk., has awarded the contract for the construction of a 1 story, 51 x 100 ft. garage and salesroom. Estimated cost, $50,000.

Ill., Chicago—The Dental Products Co., 623 South Wabash Ave., has awarded the contract for the construction of a 2 story, 75 x 100 ft. factory at 7512-18 Greenwood St. Estimated cost, $30,000.

Ill., Chicago—The Natl. Stamping & Electric Wks, 424 South Clinton St., has awarded the contract for the construction of a 1 story, 130 x 155 ft. addition to its factory at 3238-50 West Lake St. Estimated cost, $60,000.

Ill., Harvard—The Manley Motor Co. has awarded the contract for the construction of a 1 story, 68 x 113 ft. garage and sales room. Estimated cost, $30,000. E. A. Manley, Secy. Noted Oct. 27.

Ill., Peoria—C. Welti, 518 Hamilton St., is having plans prepared for the construction of a 1 story, 70 x 120 ft. garage and repair shop. Estimated cost, $40,000. B. L. Hulisbus, 1232 Jefferson Bldg., Archt.

Kan., Parsons—W. N. Chapman is having plans prepared for the construction of a 2 story, 75 x 120 ft. garage and sales room. Estimated cost, $70,000. W. S. Orme, Parsons, Archt.

Ky., Louisville—The Kokomo Rubber Co., 822 East Bway., has awarded the contract for the construction of a 2 story, 45 x 95 ft. garage (filling and battery station) on Logan St. and Bway. Estimated cost, $45,000.

Ky., Louisville—D. X. Murphy & Bro., Archts., 714 Louisville Trust Bldg., will soon receive bids for the construction of a 3 story, 40 x 180 ft. addition to machinery plant and office on 10th and Ormsby Sts. for the H. Vogt Mchy. Co. Estimated cost, $75,000.

La., Shreveport — W. E. Hampton, 725 Christian St., manufacturer of machinery, etc., plans to build an addition to shop.

Mass., Dorchester (Boston P. O.)—The Meisel Press, Dorchester Ave., Boston, has awarded the contract for the construction of a 1 and 2 story, 40 x 80 ft. and 161 x 302 ft. machine shop on Locust St., here. Estimated cost, $250,000.

Mass., Roxbury (Boston P. O.) — The Boston Elevated Ry Co., Massachusetts Ave., Boston, has awarded the contract for the construction of a 2 story, 63 x 450 ft. inspection shop at its Forest Hills yard, here. Estimated cost, $250,000.

Mass., Springfield—W. J. Hyland Mfg. Co., 151 Dwight St., will build a 3 story, 47 x 85 ft. plant on Liberty St., for the manufacture of heating goods. Estimated cost, $40,000. Noted Sept. 22.

Mass., Westfield—H. B. Smith Co., 57 Main St., will build a 1 story, 48 x 160 ft. addition to its machine shop on Main St. Estimated cost, $40,000. Private plans. Noted March 9.

Mich., Escanaba—The Wolverine Delta Motor Co. has awarded the contract for the construction of a 1 story, 100 x 138 ft. garage. Estimated cost, $45,000. Noted Jan. 26.

Minn., Minneapolis — F. S. Gold, 2004 James Ave., S., has awarded the contract for the construction of a 1 story, 150 x 200 ft. garage at 911 1st Ave., N. Estimated cost, $40,000.

Minn., Minneapolis—B. Phillips, 520 New York Life Bldg., is having plans prepared for the construction of a 3 story, 108 x 150 ft. garage and store building on Lyndale Ave., S., and 22nd St. Estimated cost, $60,000. Ar-En Co., 1219 McKnight Bldg., Archts.

N. J., Camden—Ballinger Co., Archts., 12th and Chestnut Sts., Phila., Pa., will soon receive bids for the construction of a 2 story plant on Federal St., for the manufacture of heating systems and steam specialties, for the Warren Webster Co., Point and Pearl Sts. Estimated cost, $50,000.

N. J., Newark—The Eastern Steel & Wire Co. has awarded the contract for the construction of a factory on Evergreen Ave. near Frelinghuysen Ave. for the manufacture of agricultural implements, etc. Estimated cost, $300,000.

N. J., Trenton—The Trenton Emblem Co., 120 Hamilton Ave., has awarded the contract for the construction of a 1 story, 36 x 77 ft. foundry on Hamilton Ave. Estimated cost, $10,000.

N. Y., Jamestown—S. B. Robbins, 315 West 5th St., in conjunction with the 3rd and Lafayette St. Garage Co., plans to build a 1 story, 80 x 82 ft. garage and machine shop on West 4th and Lafayette Sts. Estimated cost, to exceed $18,000. Architect not selected.

N. Y., Olean—The Pennsylvania R.R., Broad St. Sta., Phila., plans to rebuild its car shops here, which were recently destroyed by fire. Estimated cost, $150,000.

N. Y., Poughkeepsie—The Advance Boiler Co. has awarded the contract for the construction af a 1 story, 100 x 300 ft. foundry. Estimated cost, $100,000.

N. Y., Rochester—S. B. Cooper, 29 Elm St., is having plans prepared for the construction of a 3 story, 82½ x 181 ft. garage and press room on Elm St. Estimated cost, $150,000. Architect not announced.

N. Y., Watervliet—The Eastern Malleable Iron Co., Naugatuck, Conn., plans to build a 1 stroy, 50 x 250 ft. foundry, here. Architect not selected.

O., Cleveland—W. S. Ferguson, 1900 Euclid Ave., has had preliminary plans prepared for the construction of a 1 story, 60 x 120 ft. garage on East 152nd St. and Collamer Rd. Estimated cost, $40,000. Private plans.

O., Cleveland — The Hearthstone Bldg. Co., 791 The Arcade, is having plans prepared for the construction of a 2 story, 55 x 200 ft. garage and office building at 5514 Carnegie Ave. Estimated cost, $60,000. Best & Hoefler, Vickers Bldg., Archts.

O., Massillon—W. E. Wagner is receiving bids for the construction of a 2 story, 48 x 105 ft. garage. Estimated cost, $60,000. Albrecht, Wilhelm & Kelly, 1836 Euclid Ave., Cleveland, Archts.

Pa., Phila.—The Barrett Co., 36th St. and Grays Ave., (roofing manufacturers) has awarded the contract for the construction of a 1 story, 55 x 113 ft. and a 1 story, 60 x 100 ft. shop on 36th St. and Grays Ave.

Pa., Phila.—Hoffman-Henon Co., Archts., Finance Bldg., is receiving bids for the construction of a 3 story, 70 x 116 ft. garage on 15th and Locust Sts. for the V.M.C. Garage. Estimated cost, $120,000.

Pa., Phila.—M. Moister & Co., 3931 North 5th St., will build a 1 story, 50 x 180 ft. metal and woodworking factory on American and Bristol Sts. Estimated cost, $35,000.

Pa., Phila.—J. Stern & Sons, 428 North 3rd St., have awarded the contract for the construction of a 1 story, 22 x 62 ft. boiler house and garage on Cedar Ave. and Tioga St. Estimated cost, $20,000.

S. D., Mitchell—The Rozum Motor Co., 400 East 4th Ave., plans to build a 2 story, 44 x 165 ft. garage on 5th Ave. and Main St. Estimated cost, $50,000. A. J. Rozum, Pres. Architect not selected.

Vt., Brandon—The State Dept. of Institutions is having plans prepared for the construction of a 1 and 2 story, 55 x 240 ft. repair shop at the State School for Feeble Minded, here. Estimated cost, $75,000. F. L. Austin, 240 College St., Burlington, Archt.

W. Va., Huntington—The Amer. Car & Fdry. Co., 165 Bway., New York City, has awarded the contract for extensions to plant on 3rd Ave., here. Estimated cost, $500,000.

Wis., Beloit—J. H. Saris, 412 Broad St., will build a 2 story, 98 x 130 ft. garage on Broad St. Estimated cost, $30,000.

Wis., Burlington — J. A. Luke has awarded the contract for the construction of a 1 story, 66 x 130 ft. garage on Main St. Estimated cost, $40,000. Noted Dec. 8.

Wis., Madison — The Autowash Co., 7 South Bedford St., is having plans prepared for the construction of a 1 story, 70 x 169 ft. garage. Estimated cost, $40,000. M. P. Schneider, 401 West Doty St., Archt.

Wis., Milwaukee—P. Hirt, 1717 Vliet St., has awarded the contract for the construction of a 2 story, 30 x 100 ft. garage on 16th St. Estimated cost, $40,000.

Wis., South Milwaukee—The Bucyrus Co. has awarded the contract for the construction of a 1 story, 100 x 268 ft. foundry. Noted March 2.

Wis., Watertown—The Klinger Buick Co., 212 South 1st St., has awarded the contract for the construction of a 1 story, 56 x 100 ft. garage on 3rd and Jefferson Sts. Estimated cost, $40,000. Noted March 9.

General Manufacturing

Cal., Eureka—The Bd. Supervisors of Humboldt County has awarded the contract for the construction of an addition to laundry and heating plant at the Tubercular County Hospital. Estimated cost, $9,994. Noted Jan. 26.

Cal., Los Angeles—Globe A No. 1 Ice Cream Co., c/o W. A. Heitman Constr. Co., Archts., 900 Merritt Bldg., has awarded the contract for the construction of a 2 story, 148 x 276 ft. ice cream factory on Hill and Jefferson Sts. Estimated cost, $360,000.

Cal., Petaluma — Belding Bros. have awarded the contract for the construction of an addition to their silk factory. Estimated cost, $20,500.

Cal., Richmond—The Galena Signal Oil Co., South Park and Liberty Sts., Franklin, Pa., has purchased a site here, and plans to build a refinery. Estimated cost, $500,000. C. A. Miller, Supt.

Cal., Sacramento—W. C. Phillips Co., c/o Union Ice Co., 9th and C Sts., has awarded the contract for the construction of a 1 story artificial ice plant near the Western Pacific shops. Estimated cost, $16,000.

Cal., San Francisco—The Collins-Hencke Candy Co., 25 Beale St., has purchased a 130 x 135 ft. site on Folsom St. near 2nd St., and plans to build a 3 story candy factory. Architect not selected.

Cal., San Francisco—Francis-Valentine Co., 777 Mission St., has awarded the contract for the construction of a 1 story printing plant on Natoma and 8th Sts.

Cal., Tracy—The General Milk Co. of California, c/o A. J. Mazurette, Archt., 1002 H St., Modesto, is having plans prepared for the construction of a milk evaporating plant. Estimated cost, $75,000. F. S. Glass, Berkeley, Vice Pres. and Genl. Mgr.

Conn., Allingtown (r. d. New Haven)—The Velvet Textile Corp., P. O. Box 1962, has awarded the contract for the construction of a 1 story, 156 x 201 ft. textile plant, and a 1 story, 50 x 50 ft. garage and boiler house, here. Estimated cost, $100,000.

Conn., Hamden (New Haven P. O.)—The Natl. Filter Cloth and Weaving Co., 57 Hope St., Brooklyn, N. Y., is having plans prepared for the construction of a 1 story, 70 x 200 ft. textile factory on Dixwell Ave., here. Estimated cost, $60,000. Private plans.

D. C., Langdon (Wash. P. O.) — The Capitol Bedding Co., 441 G St., N. W., Wash., is having plans prepared for the construction of a factory here. Estimated cost, $65,000. Cutler & Moss, 1301 H St., N. W., Wash., Archts.

D. C., Washington — Chapin-Sacks Co., 1st and M Sts., N. E., manufacturers of ice and ice cream, is having plans prepared for the construction of a factory. Estimated cost, $75,000. J. White, 113 2nd St., N. E., Archt.

D. C., Washington—The Takoma Park Ice & Ice Cream Co. has awarded the contract for the construction of an ice plant at 326 Cedar St. Estimated cost, $20,000.

D. C., Washington — The Washington Electrotype Co., Inc., 923 11th St., N. W., plans to build a printing plant. Estimated cost, $25,000. Private plans.

Fla., Pensacola—The Figland Park Canning Co., c/o W. Honsberger, Secy., Route A, Box 219, plans to build and equip a canning plant.

Ill., Benton—Hays & Naumer Ice Co., Duquoin, is having plans prepared for the construction of a 2 story, 50 x 128 ft. ice plant. Estimated cost, $25,000. Kennerly & Stiegemeyer, Title Guaranty Bldg., St. Louis, Mo., Archts.

Ill., Brisbane—The Western Union Telegraph Co., Joliet, will soon receive bids for the construction of a 2 story creosoting plant. Estimated cost, $65,000. G. M. Yorks, 195 Bway., New York City, Engr.

Ill., Chicago — The Amer. Cabinet Co., 139 North Clark St., has awarded the contract for the construction of a 2 story, 100 x 125 ft. factory on Crawford St. near Barry Ave. Estimated cost, $100,000.

Ill., Chicago—H. E. Frees Co. (chemical laboratory), 2528 West 48th Pl., has awarded the contract for the construction of a 1 and 2 story, 50 x 122 ft. factory on Wellington Ave. Estimated cost, $25,000.

Ill., Chicago—A. V. Tiesen, Archt., 4804 North Kedzie Ave., will soon receive bids for the construction of a 2 story, 25 x 65 ft. addition to tanning factory at 1611 Lincoln St. for Ludwig & Ludwig. Estimated cost, $25,000.

Ill., Decatur—The Builders Lumber Co., 732 North Monroe St., will build a 2 story, 24 x 170 ft. lumber factory. Estimated cost, $25,000. Noted March 9.

Ill., Elgin—The Elgin Coal & Ice Co., 162 Milwaukee St., plans to build a 3 story ice plant. Estimated cost, $75,000. Architect not selected.

Ill., Evanston—The Boyle Ice Co., 847 Larrabee St., Chicago, has awarded the contract for the construction of a 2 story ice manufacturing plant at 542 Linden Ave. Estimated cost, $40,000.

Ill., Hinsdale—The village is having plans prepared for the construction of a 1 story ice plant. Estimated cost, $25,000. G. H. Williams, Clk. Private plans.

Ill., Matteson—K. I. Herman, c/o Mid West Box Co., 111 West Washington St., Chicago, is having plans prepared for the construction of a 3 story, 60 x 140 ft. chemical plant here. Estimated cost, $300,000. H. C. Miller, 112 West Adams St., Chicago, Archt.

Ill., Olney—The Sexton Mfg. Co., Fairfield, will build a 2 story knitting mill, here. Estimated cost, $30,000. Private plans. M. Ferguson, Pres. Noted March 9.

Ill., Rock Island—The Illinois Oil Co., 215 Safe Bldg., is having plans prepared for the construction of a 3 story, 40 x 150 ft. office building. Estimated cost, $160,000. Cervine & Horn, 310 Safety Bldg., Archts.

Ill., Steelville — The International Shoe Co., 15th and Washington Sts., St. Louis, Mo., plans to build a 3 story shoe factory here, to replace the one destroyed by fire. Estimated cost, $30,000. A. Hume, c/o owner, Archt.

Kan., Wichita — The Central Furniture Co., South Santa Fe St., is building a 1 story, 75 x 100 ft. furniture factory on Santa Fe St. Estimated cost $40,000.

Kan., Wichita — The Empire Sand & Material Co., 102 Northern Bldg., will build a 1 story, 60 x 120 ft. cement and brick plant on Athenian Ave. Estimated cost, $10,000.

Mass., Boston—F. A. Norcross, Archt., 46 Cornhill St., is receiving bids for the construction of a 5 story, 22 x 50 ft. factory on Cross St., for the Boston Spaghetti Co., Cross St. Estimated cost, $30,000.

Mass., Lawrence—The Amer. Woolen Co., 245 State St., Boston, is having plans prepared for the construction of a 6 story, 100 x 500 ft. addition to Washington Mills, here. Estimated cost, $800,000. Private plans.

Mass., North Carver—L. S. Baker plans to build a 2 story knitting mill, also a dye house. Private plans.

Mass., Springfield—The Bakery Finance Corp., Dexter Bldg., plans to build a modern bakery. Architect not selected.

Me., Skowhegan—The Maine Spinning Co. plans to build a spinning mill. Estimated cost, $200,000. Architect not announced.

Md., Baltimore — W. S. Lowell, c/o Pocomoke City Roller Mills, Pocomoke City, will receive bids until April 1 for the construction of a 3 story, 40 x 55 ft. flour mill, here. Estimated cost, $30,000.

Mich., St. Joseph—The Gurinian Candy Co., c/o C. A. Esser, Archt., 38 South Dearborn St., Chicago, has awarded the contract for the construction of a 3 story, 80 x 204 ft. factory on Longfellow Ave. and Bway. Estimated cost, $100,000.

Minn., Minneapolis — The Franklin Cooperative Creamery Assn., 2601 Franklin Ave., E., has awarded the contract for the construction of a 2 story, 123 x 154 ft. creamery on 21st and Washington Aves. N. G. Solem, Mgr. Estimated cost, $125,000. Noted Nov. 10.

Mo., Columbia — The Columbia Bottle Wks., c/o R. Cassidy, has awarded the contract for the construction of a 1 story, 70 x 135 ft. bottling plant. Estimated cost, $35,000. Noted March 2.

Mo., Marble Hill—The Parks Milling Co. plans to build a 2 story flour mill. Estimated cost, $25,000. Architect not selected.

Mo., St. Joseph — The Bd. Pub. Wks. plans to build an asphalt plant. Estimated cost, $25,000. C. E. Jackson, Clk., W. K. Seitz, City Hall, Engr.

Mo., St. Louis — Lecoutour Bros. Stair Mfg. Co., 4523 Shaw Ave., is having plans prepared for the construction of a 2 story planing mill on Shaw Ave. to replace the one destroyed by fire. Estimated cost, $50,000. E. Lecoutour, Pres. E. H. Nieman, 3816 Shaw Ave., Archt.

Mo., St. Louis—The Press Sign Co., 202 South 17th St., has awarded the contract for the construction of a 2 story, 50 x 119 ft. factory at 3400 Dodier St. Estimated cost, $25,000. Noted March 16.

N. J., Beverly—The Beverly Textile Mills is having plans prepared and will soon receive bids for the construction of a 2 story, 40 x 100 ft. textile factory. Estimated cost, $38,000. Private plans.

N. J., Trenton—The Star Porcelain Co., Muirheid Ave., has awarded the contract for the construction of a 1 story, 71 x 101 ft. addition to plant. Estimated cost, $9,000. Noted Sept. 15.

N. Y., Brooklyn—The Brooklyn Retail Butchers Corp. plans to build a 4 or 5 story cold storage plant. Estimated cost, $200,000. Henschien & McLaren, 1637 South Prairie St., Chicago, Archts.

N. Y., Furniss (Oswego P. O.)—The Oswego Gardens Inc. plans to build a cold storage plant, 11,000 bbl. capacity. Estimated cost, $30,000. Address P. T. Vercrouse, Oswego.

N. Y., New York—Fleischmann Co., 701 Washington St., has awarded the contract for the construction of a 3 story yeast laboratory on Mott Ave. Estimated cost $200,000. Noted Feb. 16.

N. Y., Olean—The Vacuum Oil Co. has awarded the contract for the construction of a boiler house, transil oil building and loading platforms, drum preparation building, drum storage building, kiln building, clay storage and filter building, color tank building and pump house. Estimated cost, $100,000.

O., Cleveland — The Ward Baking Co., c/o J. B. Arthur, East 143rd St. and Southern Blvd., New York City, will soon award the contract for the construction of a 3 and 5 story, 240 x 315 ft. bakery and office building on East 45th Pl. and Windsor Ave., here. Estimated cost, $500,000. C. B. Comstock, 110 West 40th St., New York City, Archt. Noted Feb. 16.

O., Dayton—The Terminal Ice & Cold Storage Co. has awarded the contract for the construction of an ice and cold storage plant on Eaker St. Estimated cost, $85,000.

O., Toledo—The Sandusky Cement Co., c/o F. G. Herman, Engineer Bldg., Cleveland, plans to build a 1 story cement plant, 12 miles west of here. Estimated cost, $1,000,000. W. B. Rawson, Engineers Bldg., Cleveland, Archt.

Pa., Perkasie—S. M. Schwenk is having plans prepared and will soon receive bids for the construction of a 2 story, 50 x 120 ft. knitting factory. Estimated cost, $35,000. J. S. Landis, Soudertown, Archt.

Pa., Phila.—Morice Twine Co., 84 Tasker St., has awarded the contract for the construction of a 2 story, 112 x 156 ft. factory on Delaware Ave. and Dickenson St. Estimated cost, $175,000. Noted Jan. 26.

Pa., Phila.—The [illegible] City Cold Storage Co., 301 Del[illegible], will build a 1 story, 27 x 126 [illegible]nt at 310 South Delaware Ave. Estimated cost, $75,000. Private plans.

Pa., Phila.—The Rogers Hosiery Co., Lena and Collom Sts., is having plans prepared for the construction of a 3 story, 154 x 174 ft. mill on Stenton and Wyoming Aves. Estimated cost, $300,000. Private plans.

Pa., Washington—W. L. Stoddart, Archt. and Engr., 9 East 40th St., New York City, will open bids about April 10 for the construction of a printing plant, for the Observer Publishing Co. Estimated cost, $200,000.

Wis., Mayville—The Peerless Traveling Goods Co. and J. E. Hennen, Archt., 74 South Main St., Fond-du-Lac, are receiving bids for the construction of a 2 story, 64 x 84 ft. factory on Main St. Estimated cost, $30,000. Noted March 16.